

COEXISTING ON EARTH

Homo sapiens QUAGMIRE



BY: MICHAEL C. CLARK

Coexisting on Earth *Homo sapiens* Quagmire
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A Loganapithecus Production

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This Book is Dedicated to:

Maya Rain and all the children of the world, for it is the children that are the future, and this is what will truly change the world in a positive way.

and to

Loganapithecus, who was not my dog, but a compañero that found me through fate.

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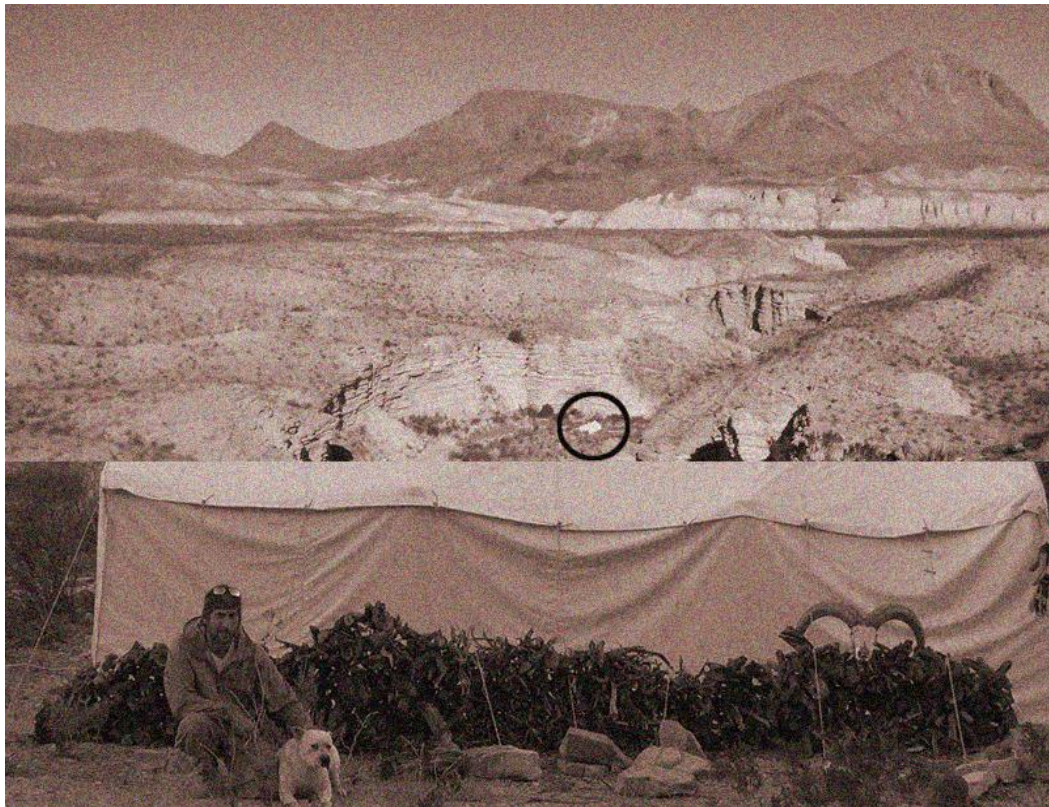
Going Back to Nature and Coexisting on Earth

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INTRODUCTION

Having explored and been fascinated with nature since childhood in the bayous of Louisiana and the deserts of Arizona, I have always asked questions like, why don't more *Homo sapiens* see the beauty and perfection in the natural world? Why are *Homo sapiens* so immersed in civilization searching for something that is right in front of them in nature? Why are *Homo sapiens* so ruthlessly destroying the Earth? In 2010, I escaped the thrall of society and set off with my compañero to explore the ecosystems of the western United States. I bought a video camera and began filming the nature I was encountering, but not in the traditional nature documentary sense of focusing on sensationalism and death while only filming one species. Instead, I filmed in cinéma-vérité style and shot everything, flora, fauna, weather, landscapes, geology, and even *Homo sapiens* depredations, in short everything I encountered. I did not bait, wait, or specifically seek out species, I simply explored and filmed what I discovered while hiking on foot.

Between July 2010 and November 2012, we explored 33 ecosystems in 11 western states filming more than 20,000 shots to ultimately produce 70 hours of documentary film. During those 2 years in the wilds of nature I contemplated much about not only nature, but about the civilized world I had left behind, and when we came out of the wilds of nature to resupply every few weeks I felt even more disconnected with society and that I had no real place in it. I could not understand how or why all this nature was just ignored by most and why so many were destroying the planet while so few were trying to preserve and study it. Eventually, I purchased a very remote property in the Chihuahuan desert of southwest Texas, where I set up an 18' x 12' cotton canvas tent with poles made from sotol and lived in a canyon for 2 years having very little contact with the outside world. It was about as close as one could get in today's United States to that of the world which Henry David Thoreau, John Muir, and other eccentric outcasts of that era experienced, and the one which I had longed for all my life. It is remote in every sense of the word, 10 miles north of the Mexico border, the nearest neighbor was several miles away, the nearest town was a 45-minute drive away, the nearest hospital 100 miles away, and the nearest Walmart 250 miles away. There is no light pollution, and on a clear night one can see the Milky Way Galaxy with the naked eye, one of the last places in the continental United States where this is still possible.



It was here after 15 years that my compañero lived out his last days, and it was here that we finally made our home, coexisting in the wilds of nature making a very small footprint living naturally as we had done all along while on expedition. I finally edited all the nature footage shot on expedition combined with the footage which was shot while exploring the Chihuahuan desert ecosystem over 2 years and distributed it freely online. www.thenatureexplorers.com All the while still contemplating about civilization and the continuous depredation of Earth, and so, I began writing what eventually became the contents of this book. It was not originally intended to be a book, but more answers to my questions. Did I find any answers? I like to think so, and although there are many answers, my overall conclusion is that most *Homo Sapiens* have lost their connection with nature.

Reading this book, one may think it negative or pessimistic and that it is too critical of *Homo sapiens*. Some may have not yet evolved enough intellectually, spiritually, or morally and will most likely not agree with many of the points made in this book. Others will undoubtedly find some things in this book offensive to their way of life and will disagree with some of the points made, but as the adage goes, you can have your own opinion but not your own facts. Scientific facts are not lies but the truth. Hippocrates remarked,

“There are, in effect, two things: to know and to believe one knows. To know is science. To believe one knows is ignorance.”

Opinions do not change the facts which are within this book, nor do they alter the reality which surrounds you and the rest of the world right now, the reality which so many are oblivious to. The truth can sometimes hurt, especially to the ignorant and closeminded which do not see the reality of the world, and thus they are even more so reluctant to change. I can only say this to those individuals, examine the information presented in this book, thoroughly examine the references quoted, and perhaps you too will come to similar conclusions and ask some of the same questions which are in this book. You can show *Homo sapiens* reality through education and access to the scientific truth, but unfortunately you can't make them believe it, this they must do on their own with reason. Thomas Paine wrote,

"The most formidable weapon against errors of every kind is reason."

Many are born into a world of lies and misconceptions, and if one wants to find out the truth they must seek it out on their own, too few fortunate individuals are exposed to the truth early on in life, if at all. Everyone surely knows of some type of social and environmental issues on Earth, and they may even be affected directly, but I would postulate that very few know the entire scope of what is covered in this book. My hope is that the reader will come away with a different perspective on the issues covered in this book, as I don't think most realize the vastness and more importantly the severity of the issues, much less the true history of civilization. Many of the issues which are discussed in this book are unknown to most, they receive little to no news coverage by most of the mainstream news media, most politicians are not focused on solving these issues, and they are rarely if ever spoken about during the daily conversations of most average citizens. If the issues remain unknown to most, and there is no political and public discourse about these issues they will most likely take far longer to solve.

Many of the issues in the world today are caused from the majority of *Homo sapiens* lacking even a basic respect for Earth because they have no true connection with nature, being imprudent and having no forethought about what their negative actions will do, lack of basic environmental education, too much focus on materialism and greed, corrupt governments which are heavily influenced by polluting corporations, and environmental laws not being stringent enough or not being enforced at all. When *Homo sapiens* are not affected directly by an issue, they often do not know, and thus they do not care as it is out of sight and out of mind. Many individuals are not scientifically minded and do very little scientific reading, which results in much of society being extremely ignorant about critical scientific issues affecting the environment and society itself.

The CIA World Factbook states,

“The Intelligence Cycle is the process by which information is acquired, converted into intelligence, and made available to policymakers. Information is raw data from any source, data that may be fragmentary, contradictory, unreliable, ambiguous, deceptive, or wrong. Intelligence is information that has been collected, integrated, evaluated, analyzed, and interpreted. Finished intelligence is the final product of the Intelligence Cycle ready to be delivered to the policymaker.

The three types of finished intelligence are: basic, current, and estimative. Basic intelligence provides the fundamental and factual reference material on a country or issue. Current intelligence reports on new developments. Estimative intelligence judges probable outcomes. The three are mutually supportive: basic intelligence is the foundation on which the other two are constructed; current intelligence continually updates the inventory of knowledge; and estimative intelligence revises overall interpretations of country and issue prospects for guidance of basic and current intelligence. The World Factbook, The President's Daily Brief, and the National Intelligence Estimates are examples of the three types of finished intelligence."

I have attempted to follow this intelligence standard in writing this book and have gathered the latest data from the most reliable and reputable sources, and when applicable ensuring the data is from scientific sources that have directly observed and analyzed the subject, rather than an extremist or alarmist writer which has manipulated and exaggerated the data. There appears to be widespread exaggeration of statistical data regarding environmental and social issues by some non-profit organizations in what I can only imagine is their attempt to gain support by exasperating the issues, these sources have been eliminated entirely. It is very important to check all the facts on a subject before making any decisions, judgments, or speculations as there are many sources which glamorize facts in an attempt to make them sound even more spectacular than they really are. For instance, if someone were to say that some 200 flora and fauna species go extinct every year, it initially sounds like a very large number, but if one were to compare this number with the total number of identified and catalogued flora and fauna species, which is 1,200,000 the 200 number seems rather small. At this rate in 100 years 20,000 species would go extinct or 1.6%, which is a relatively small percentage of species. That is not to say that this number is not concerning, nor does it mean that nothing should be done to correct it, but it should not be the focal point and it should be put into context with other data like the total number of species, is the species rare and there have never been more than 100 living on Earth at any given time, and ultimately what is causing the extinction.

When noted, some information in this book was sourced from Wikipedia and has not yet been verified, thus the information is ambiguous raw data and there may be some inaccuracies in this data, it is not finished intelligence. Many of the statistics in this book are only for the United States and not the world as none are available in many instances, and therefore the actual totals are most likely far greater when contemplating the issues on a global scale. Some of the issues are even greater in 3rd world countries, as they are so far behind the western world in conservation, recycling, education, etc. Some facts and even estimates are unavailable, or the data is extremely old. It makes one also wonder why so much important data is limited or hard to find in the age of information, why doesn't the government publish data, even if it's estimative intelligence, on every environmental and social issue for each year from the last 100 years? I have refrained from using number words like trillion, billion, or million when giving a statistic, as I feel number words such as these do not emphasize the reality and actual scale of things. Large number words seem to have become common place and are interpreted as just meaning allot and the reality of the actual number is not seen, 1,000,000,000,000 or trillion, 13 characters turns to 8, the word literally shrinks the size of the actual number and it has less impact, especially when attempting to visualize facts regarding subjects like population, pollution, death, etc.

I was told when I was a kid, like so many others, that I asked too many questions and that I should accept some things simply for what they are. I would not accept this, and so I asked even more questions as I still do to this day. Some questions are simply unanswerable but are asked more to put the subject matter or amount of something into perspective. (e.g. How much oil has been used since it was discovered thousands of years ago? How much environmental damage has been done to Earth from all the oil ever extracted?) These types of questions are impossible to answer accurately or even estimate, but one could surmise that it is an enormous amount and that it has done allot of environmental damage. Other questions are self-explanatory and are simply asked to convey or emphasize a point. And some questions are unknowable at this stage but should be asked as they will be relevant in the future. This book by far does not cover every issue or all of *Homo sapiens* depredations, there are simply too many, not to mention some of which are not even known to anyone but those committing the destructive act. I have attempted to keep the composition of facts in this book intact by quoting the sources in exact detail in order to be as meticulous as possible. Anyone can reference any of the resources listed in the bibliography for additional information, and some sources can also be contacted with further questions.

About the cover photo: This image was taken on our last expedition of Series 4, the '*El Rio De Las Animas Perdidas En Purgatorio Expedition*' in Colorado during November 2012. It was the last day of the expedition, winter was setting in, and the mornings were cold. We had just arisen from our chilly slumber when a vehicle arrived near our camp, and two males exited the vehicle with rifles entering the brush. About 30 minutes later we heard a gunshot, and then the loud yelping of a canine agonizing. About 10 minutes later the two men came back to their vehicle at which time I approached them, the canine endlessly yelping in the background. The first thing they did was anxiously boast about their recent murder in asking, "Did you hear us shoot we got one!" I responded, "I hear a coyote yelping that sounds as though you shot it and left it to suffer and die." Their excuse was that it deserved to suffer, that it was a filthy disgusting animal that should be extinct. They proceeded to explain how it was legal to kill coyotes, and although no one had asked them, they had taken up the task of killing coyotes on the weekends to help keep population numbers in check, and as an added bonus they got to kill coyotes for sport. They drove off with the coyote was still yelping in agony.

Over the next hour I heard several other coyotes in the distance calling, but to no avail, their companion would never answer their calls as it had been ruthlessly and senselessly murdered. About 20 minutes later, once the other coyotes had found their fallen pack member, they let out horrendous, violent, angry yelping noises that lasted some 10 minutes. As anthropomorphic as it may sound, it was as if they knew that their fellow species member had been murdered like so many others before it. I tracked where the two men had been ultimately leading me to the body of the dead coyote. During my two and a half years of filming the Western North American Ecosystems I always wanted to get footage of a coyote, which is quite difficult in the wild as they are very elusive and nocturnal. This was the only picture that I ever took of a coyote, and to me personally, it is a perfect representation of the quagmire *Homo sapiens* have with coexisting on Earth.

About the first edition: I have contacted numerous publishers and am told the traditional publishing process is a slow one and that it could take up to a year or more to release the book, if at all. This book has not been proofread by an editor or anyone else, my forte is not writing, and I can be extremely long-winded at times. So, if the reader would be so kind as to forgive the author in advance for the grammatical errors and the unordered bibliography. Although the book is not complete in this sense, I am releasing the book, as is, with the errors intact, as I feel, due to the subject matter being discussed it is imperative to release now. This book is a work in progress, and there will no doubt be revised editions in the future which will contain grammatical corrections as well as additional statistical information. But the data and message of the book, as is, will be clear to most if they can simply look past the grammatical errors and focus more on the message being discussed. Not to justify these errors in any way, but other authors are notorious for having used bad grammar. (e.g. Charles Dickens for using run-on sentences, E.E. Cummings for not capitalizing words, H. L. Mencken for incomplete sentences, William Faulkner for starting a sentence with a conjunction, Jane Austen for using double negatives, William Shakespeare for ending a sentence with a preposition, and more recently E. L. James's '*Fifty Shades of Grey*' also contained numerous grammatical errors)

CHAPTER I.

Homo sapiens Lost Connection with Nature and the Aftermath

Agriculture and the Origins of Modern Civilization

'*It's not a perfect world*' is an axiom that most *Homo sapiens* would not argue with, but the Earth was nearly perfect, from a perspective of nature and the ecosystems which other biota inhabit, and this time was not in the too distant past. A relatively perfect, balanced, and flawless system with few depredations done by *Homo sapiens*, mainly the extinction of some large fauna species during the Pleistocene era caused by overhunting and destruction of habitat, which coincided with *Homo sapiens* colonization of Australia, New Zealand, North America, and Madagascar. (635) *Homo* and their closely related extinct relatives coexisted on Earth in very small numbers perfectly for some 8,000,000 or more years, but over the last 10,000 years, *Homo sapiens* have gradually lost a vital natural connection and respect for Earth, but more especially towards the florae and faunae which also inhabit the planet. This sudden and devastating change began around the time when mass agriculture was started resulting in the development of civilizations, and eventually led to, among other things, religions, governments, money, corporations, and a plethora of social issues.

When mass agriculture was started around 10,000 years ago, it resulted in an abundant surplus of food, this quickly led to the establishment of villages, towns, city-states, and ultimately countries. This power over the masses with food and eventually other necessities in life, led to social hierarchies based on wealth which have persisted and had a negative impact not only on society, but also on the Earth as well. With agriculture, the world began to organize and thrive in many aspects, yet it was also the start of many negative social traits like the self-seclusion mentality, xenophobia, and nationalism. Eventually over time, social immoralities evolved not only within some societies themselves, but also towards other outside different societies as well, many of which still plague some present-day societies. (e.g. war, discrimination, racism, murder, rape, social classes, greed, slavery, assimilation of indigenous *Homo sapiens*, etc.)

Around 300 years ago, when commercial agriculture overtook subsistence farming with monoculture, this was quite possibly one of the most defining moments which helped in creating a very dilapidated future for the life sustaining food sources *Homo sapiens* consume. That is to say, it propelled *Homo sapiens* greed and tyranny to an entirely new realm, in the fact that food is a necessity and once a species is dependent on a source of readily available food it becomes far less independent. One can plainly see an example of this in domesticated animals and more especially in the dog. This commercialization of agriculture also changed the type and quality of the food being consumed which resulted in a range of health issues and chronic diseases of affluence which most western societies are currently experiencing, some at epidemic proportions. (e.g. obesity, diabetes, high blood pressure, cardiovascular disease, chronic kidney disease, strokes, various cancers, etc.)

Over the last 300 years more and more *Homo sapiens* have moved to civilization where all the necessities of life are readily available, in 2017 an estimated 50% of the 7,300,000,000 *Homo sapiens* living on Earth dwell in an urban area. (106) As a result, there has been less individual dependency on nature for sustenance, which has also led to less interaction with nature. (e.g. gathering food, firewood, water, etc.) Not having to rely on nature for daily sustenance and thus not interacting with nature on a daily basis also helped to make many *Homo sapiens* less respectful towards Earth, as it seems meaningless to be a good steward of Earth or to even care about how civilization has depredated the Earth and continues to ever more increasingly. What took Earth 4,500,000,000 years to evolve into, *Homo sapiens* depredations over a very short period have either altered or completely destroyed forever.

Most modern-day agriculture is unsustainable because of the negative and unnatural methods being used. (e.g. genetic modification, monoculture, synthetic fertilizers, pesticides, etc.) Some companies even go so far as to transport bees thousands of miles to pollinate their agricultural crops. Others attempt to change the landscape or practice agriculture under near impossible environmental conditions wasting precious resources. Ward Chesworth wrote,

“In addition, it must be recognized that agriculture as practiced from the start, has never been sustainable. It has always resulted in a drawdown of the natural capital of the Earth to the degree that human beings have become a dominating geological force on the planetary surface, and the long-term persistence of human civilization has become problematical. In the words of Angus Martin (1975): 'How many millennia of deforestation, dust storms and soil erosion has it taken for us to realize that our agricultural methodology has had serious flaws in it from the start.'” (12)

If society would not have gone down the path of greed and tyranny started by the surplus of food could a more utopian world have developed? Even today there seems to be social, moral, or other issues affecting an even more abundant food surplus. The Green Revolution helped to produce higher yielding crops in less time and ultimately a food surplus, and yet there is a food distribution problem and some *Homo sapiens* are starving to death as a result. Whether it be self-inflicted from war, greed, environmental depredations, or civilization's expansionist tendencies, the entire history of *Homo sapiens* has been one in which millions continue to die from easily preventable causes, and in essence these deaths are a result of nothing more than a dysfunctional society. One might think that in modern society, with all the social, scientific, and technological advancements which have been made up until this point, that the basic necessities to live, (e.g. water, food, medicine, shelter, education, restroom access, etc.) would be available to every citizen of Earth at no monetary cost, and that they would also be of the highest quality. When a society begins to seek extreme financial profits from the necessities of life, and some *Homo sapiens* are living in poverty with limited or no access to these necessities, there has been a serious moral deterioration within that society.

***Homo sapiens* Current Food Consumption**

Current food quality and availability is now mainly controlled by a few commercial food and agricultural related companies, and the mergers and takeovers have only continued. Dow Chemical and DuPont merged in 2017, and Bayer's proposed takeover of Monsanto in 2016 which is expected to be finalized in 2018, are the most recent monopolies to emerge. Chinese investors have also spent \$91,000,000,000 over the last 10 years purchasing nearly 300 foreign companies involved in food, agriculture, or chemicals. (429) These commercial food and agricultural related companies heavily influence agricultural, food, health, and other related government policies. And now with food libel laws having recently been passed in 13 U.S. states any person or group that makes disparaging comments about food products could potentially be sued by the food manufacturer or processor simple for being a critic.

The March 2016 National Geographic Magazine, noted that out of the 30,000 known edible plants on Earth, only 7,000 are cultivated or collected for food, and only 30 of these are staple crops which feed most *Homo sapiens*. In the United States, the U.S. farm bill and other government legislation has allowed for the subsidization of corn, soy, wheat, and rice making these four main sources of processed unhealthy foods cheap, while healthy fruits and vegetables have little to no subsidization at all. These government subsidies are used to create environmentally destructive, inexpensive, unhealthy foods loaded in fat, salt, and sugar. Can't the commercial food and agricultural industries in an eco-friendly manner produce inexpensive, plentiful, healthy, all-natural organic fruits and vegetables using these same subsidies, and if so, why aren't they? History has proven that food can be healthy and that it, along with all other living necessities can be created from natural biodegradable sources, which can be grown in abundance very inexpensively and in an eco-friendly manner. So why isn't it still being done today as was done for thousands of years before?

Most of the food available today is highly-refined, has additives, is genetically modified, and from an extremely unhealthy food source containing little natural nutritional value. Many of the foods available to consumers have traveled hundreds even thousands of miles across the globe from the source requiring chemical additives or other unnatural processes to maintain it edibility. The food today that has been highly-refined is loaded with additional artificial ingredients, flavor enhancers, preservatives, and is fortified or enriched with added nutrients. Sodium is added excessively to most all foods in the form of iodized salt, sea salt, or other artificially created sodium-based ingredients like sodium bicarbonate, sodium aluminum phosphate, sodium stearoyl lactylate, etc. *Homo sapiens* ingest vast quantities of iodized salt which has been enriched with inorganic compounds like potassium iodate, potassium iodide, sodium iodate, or sodium iodide. Can consumers not get enough from consuming beans, strawberries, cranberries, potatoes, or other fruits and vegetables which are naturally rich in iodine? As the food

is processed a host of other mostly artificial ingredients are added to enhance flavor, aesthetic appeal, and help with preservation. As a result of all the processing, nutritional value is lost and the foods are then fortified or enriched with things like whey, gluten, niacin, iron, thiamin, vitamin C, etc. to add back the lost nutrition. Sugar substitutes like aspartame and other artificial sweeteners are also added to many food items in an attempt to market them as healthier. High fructose corn syrup is added to many foods as a sugar substitute and vast quantities are consumed in the form of soda and other so called '*junk foods*'. The U.S. Food and Drug Administration monitors the levels of about 800 contaminants and nutrients contained in consumer foods. Foods have nutrition fact labels and the ingredients listed, so why then isn't every contaminant also listed with another label entitled '*accumulated hidden toxins*'? If every contaminant and the possible side-effects were also listed would most consumers just ignore the warning as so many do with alcohol and tobacco? Would *Homo sapiens* have less contaminated food and be healthier if they became involved directly in their food production by having a small garden, versus depending entirely on the food system which corporations have set up based mainly around profits and not nutrition?

Often, food is erroneously marketed with misleading words like nutritional, healthy, fat-free, sugar-free, ecological, eco-friendly, or natural, when in fact it is some of the most disgusting, unhealthy, and unnatural food available. Some companies even display misleading images showing something that looks healthy, yet the final product is nothing like the image used to advertise the product. Why is it legal for food companies and restaurants to advertise picture-perfect food on a food product label, product packaging, menu, or in commercial advertisements, when in fact the final product being consumed is nowhere near the one being advertised, and is far different in reality, is this not false advertising? Why do consumers continue to buy into this picture-perfect food lie?

In most grocery stores, foods that are preservative free, additive free, low-sodium, non-GMO, vegan friendly, and organic are becoming more mainstream, but a wide selection is very difficult to find, and one must often resort to a specialty store like Whole Foods, Trader Joe's, another local vegan grocery store, cultural or regional markets or stores, or a farmers' market. Many times, it also costs far more than unhealthy food which is created to sell more and marketed to sell to all, thus making it impossible for some consumers to afford healthy vegan food. Vegan and eco-friendly products cost far less to manufacture, but as demand for vegan and eco-friendly products has increased often with little competition, some vegan food companies are engaged in price gouging. If companies did less price gouging on vegan and eco-friendly products would there be far more consumers using them? If the pricing issue is partially due to manufacturing costs being so high, would this decrease if vegan and other eco-friendly products became mainstream? Why would a consumer, especially if they are on a very fixed income with such a limited budget, choose a vegan or other eco-friendly product if it costs twice as much?

One could hypothesize that food sources of the not too distant past tasted purer and natural and were perhaps even more nutritional than today's food. Could this be in part to the food sources having been more organic, unmodified, unrefined, Earth not having been as polluted terrestrially or atmospherically, and the soils having not been so overtaxed? Or could the flavor have been literally bred out of food from modifying it too much? A 2017 study on improved tomato flavor found that modern commercial tomato varieties contained significantly lower amounts of many important flavor chemicals than older tomato varieties. (503) The following is a general list of food additives, most of them are not naturally present in any food source and are synthesized in a laboratory setting. How can consumers accept and consume foods that have been modified with so many unnatural and unhealthy additives? Why are all of these additives put in foods when so many natural and unmodified food sources already exist?

Some of the Additives Used in Food	
1,4-heptonolactone – food acid 2-hydroxybiphenyl – preservative Acesulfame potassium – artificial sweetener Acetic acid – acidity regulator Acetic acid esters of mono- and diglycerides of fatty acids – emulsifier Acetylated distarch adipate – thickener	Lecithins – antioxidant, Emulsifier Lecithin citrate – preservative Leucine – flavor enhancer Lipases – flavor enhancer Lithol Rubine BK – color Litholrubine – color

Acetylated distarch phosphate – thickener	L(+)-Tartaric acid – food acid
Acetylated oxidised starch – thickener	Lutein – color
Acetylated starch – thickener	Lycopene – color
Acid treated starch – thickener	Lysozyme – preservative
Agar – thickener, stabilizer, gelling agent	Magnesium carbonate – anti-caking agent, mineral salt
Alginic acid – thickener, stabilizer, gelling agent, emulsifier	Magnesium chloride – mineral salt
Alitame – artificial sweetener	Magnesium citrate – acidity regulator
Alkaline treated starch – thickener	Magnesium diglutamate – flavor enhancer
Allura red AC – color (FDA: FD&C Red #40)	Magnesium hydroxide – mineral salt
Aluminium – color (silver)	Magnesium lactate – food acid
Aluminium ammonium sulfate – mineral salt	Magnesium oxide – anti-caking agent
Aluminium potassium sulfate – mineral salt	Magnesium phosphates – mineral salt, anti-caking agent
Aluminium silicate – anti-caking agent	Magnesium salts of fatty acids – emulsifier, stabiliser, anti-caking agent
Aluminium sodium sulfate – mineral salt	Magnesium silicate – anti-caking agent
Aluminium sulfate – mineral salt	Magnesium stearate – emulsifier, stabiliser
Amaranth – color (red) (FDA: [DELISTED] Red #2) Note that amaranth dye is unrelated to the amaranth plant	Magnesium sulfate – mineral salt, acidity regulator, firming agent
Ammonium acetate – preservative, acidity regulator	Malic acid – acidity regulator
Ammonium adipates – acidity regulator	Maltitol – humectant, stabiliser
Ammonium alginate – thicken, stabilizer, gelling agent, emulsifier	Maltodextrin – carbohydrate sweetener
Ammonium bicarbonate – mineral salt	Maltol – flavor enhancer
Ammonium carbonate – mineral salt	Mannitol – humectant, anti-caking agent, sweetener
Ammonium chloride – mineral salt	Metatartaric acid – food acid, emulsifier
Ammonium ferric citrate – food acid	Methyl butyrate – used as food flavoring
Ammonium fumarate – food acid	Methyl ethyl cellulose – thickener, emulsifier
Ammonium hydroxide – mineral salt	Methylcellulose – thickener, emulsifier
Ammonium lactate – food acid	Methylparaben (methyl para-hydroxybenzoate) – preservative
Ammonium malate – food acid	Microcrystalline cellulose – anti-caking agent
Ammonium phosphates – mineral salt	Mixed acetic and tartaric acid esters of mono- and diglycerides of fatty acids – emulsifier
Ammonium phosphatides – emulsifier	Modified starch – also called starch derivatives, are prepared by physically, enzymatically, or chemically treating native starch to change its properties
Ammonium polyphosphates – anti-caking agent	Mono- and diglycerides of Fatty acids – emulsifier
Ammonium sulfate – mineral salt, improving agent	Monoammonium glutamate – flavor enhancer
Anthocyanins – color	Monopotassium glutamate – flavor enhancer
Argon – propellant	Monosodium glutamate (MSG) – flavor enhancer
Ascorbyl palmitate – antioxidant (fat soluble)	Monostarch phosphate – thickener
Ascorbyl stearate – antioxidant (fat soluble)	Montanic acid esters – humectant
Aspartame – artificial sweetener	Natamycin – preservative
Azodicarbonamide – flour bleaching agent. Also used in the production of foamed plastics and the manufacture of gaskets. Banned as a food additive in Australia and Europe.	Neohesperidin dihydrochalcone – artificial sweetener
Azorubine – color (red) (FDA: Ext D&C Red #10)	Nisin – preservative
Baking powder – leavening agent; includes acid and base	Nitrates - The use of nitrates in food preservation is controversial. This is due to the potential for the formation of nitrosamines when nitrates are present in high concentrations and the product is cooked at high temperatures. The effect is seen for red or processed meat, but not for white meat or fish. The production of carcinogenic nitrosamines can be potently inhibited by the use of the antioxidants Vitamin C and the alpha-tocopherol form of Vitamin E during curing.
Baking soda – food base	Nitrogen – propellant
Bentonite – anti-caking agent	Nitrous oxide – propellant
Benzoic acid – preservative	Norbixin – color
Benzoyl peroxide – flour treatment agent	Octyl gallate – antioxidant
Bergamot – in Earl Grey tea	Orange GGN – color (orange)
Beta-apo-8'-carotenal (C 30) – color	Orcein – color (red)
Beta-apo-8'-carotenic acid ethyl ester – color	Orchil – color (red)
Betanin – color (red)	Orthophenyl phenol – preservative
Biphenyl – preservative	Patent blue V – color (blue)
Bixin – color	Phosphated distarch phosphate – thickener
Black 7984 – color (brown and black)	Phosphoric acid – food acid
Black PN – color (brown and black)	Phytic acid – preservative
Bleached starch – thickener	
Bone phosphate – anti-caking agent	
Borax – preservative	
Boric acid – preservative	
Brilliant Black BN- color (brown and black)	
Brilliant blue FCF – color (FDA: FD&C Blue #1)	
Brilliant Scarlet 4R – color (FDA: Ext D&C Red #8)	
Brown FK – color (brown and black)	
Butane – propellant	
Butylated hydroxyanisole (BHA) – antioxidant (fat soluble)	
Butylated hydroxytoluene (BHT) – antioxidant (fat soluble)	

Calcium 5'-ribonucleotides – flavor enhancer	Pigment Rubine – color
Calcium acetate – preservative, acidity regulator	Poly vinyl pyrrolidone – used as a stabilizer
Calcium alginate – thickener, stabilizer, gelling agent, emulsifier	Polydextrose – humectant
Calcium ascorbate – antioxidant (water-soluble)	Polyethylene glycol 8000 – antifoaming agent
Calcium aluminosilicate (calcium aluminium silicate) – anti-caking agent	Polyglycerol esters of fatty acids – emulsifier
Calcium ascorbate (Vitamin C)	Polyglycerol polyricinoleate – emulsifier
Calcium benzoate – preservative	Polymethylsiloxane – antifoaming agent
Calcium bisulfite – preservative, antioxidant	Polyoxyethylene (40) stearate – emulsifier
Calcium carbonates – color (white), anticaking agent, stabiliser	Polyoxyethylene (8) stearate – emulsifier, stabilizer
Calcium chloride – mineral salt	Polyphosphates – mineral salt, emulsifier
Calcium citrates – food acid, firming agent	Polysorbate 20 – emulsifier
Calcium diglutamate – flavor enhancer	Polysorbate 40 – emulsifier
Calcium disodium EDTA – preservative	Polysorbate 60 – emulsifier
Calcium ferrocyanide – anti-caking agent	Polysorbate 65 – emulsifier
Calcium formate – preservative	Polysorbate 80 – emulsifier
Calcium fumarate – food acid	Polyvinylpolypyrrolidone – color stabiliser
Calcium gluconate – acidity regulator	Ponceau 4R – color (FDA: Ext D&C Red #8)
Calcium guanylate – flavor enhancer	Ponceau 6R – color
Calcium hydrogen sulfite – preservative, antioxidant	Ponceau SX – color
Calcium hydroxide – mineral salt	Potassium acetates – preservative, acidity regulator
Calcium inosinate – flavor enhancer	Potassium adipate – food acid
Calcium lactate – food acid	Potassium alginate – thickener, stabilizer, gelling agent, emulsifier
Calcium lactobionate – stabilizer	Potassium aluminium silicate – anti-caking agent
Calcium malates – food acid	Potassium ascorbate – antioxidant (water-soluble)
Calcium oxide – mineral salt	Potassium benzoate – preservative
Calcium peroxide – is used as flour bleaching agent and improving agent	Potassium bicarbonate – mineral salt
Calcium phosphates – mineral salt, anti-caking agent, firming agent	Potassium bisulfite – preservative, antioxidant
Calcium polyphosphates – anti-caking agent	Potassium bromate – flour treatment agent
Calcium propionate – preservative	Potassium carbonate – mineral salt
Calcium salts of fatty acids – emulsifier, stabiliser, anti-caking agent	Potassium chloride – mineral salt
Calcium silicate – anti-caking agent	Potassium citrates – food acid
Calcium sorbate – preservative	Potassium ferrocyanide – anti-caking agent
Calcium stearoyl lactylate – emulsifier	Potassium fumarate – food acid
Calcium sulfate – flour treatment agent, mineral salt, sequestrant, improving agent, firming agent	Potassium gluconate – stabiliser
Calcium sulfite – preservative, antioxidant	Potassium hydrogen sulfite – preservative, antioxidant
Calcium tartrate – food acid, emulsifier	Potassium hydroxide – mineral salt
Canthaxanthin – color	Potassium lactate – food acid
Capsanthin – color	Potassium malate – food acid
Capsorubin – color	Potassium metabisulfite – preservative, antioxidant
Caramel I (plain) – color (brown and black)	Potassium nitrate – preservative, color fixative
Caramel II (Caustic Sulfite process) – color (brown and black)	Potassium nitrite – preservative, color fixative
Caramel III (Ammonia process) – color (brown and black)	Potassium phosphates – mineral salt
Caramel IV (Ammonia sulfite process) – color (brown and black)	Potassium propionate – preservative
Carbamide – flour treatment agent	Potassium salts of fatty acids – emulsifier, stabiliser, anti-caking agent
Carbon black – color (brown and black)	Potassium sodium tartrate – food acid
Carbon dioxide – acidity regulator, propellant	Potassium sorbate – preservative
carmines – color (red)	Potassium sulfate – mineral salt, seasoning
Carmoisine – color (red) (FDA: Ext D&C Red #10)	Potassium sulfite – preservative, antioxidant
Carotenes – color	Potassium tartrates – food acid
Alpha-carotene – color	Powdered Cellulose – anti-caking agent
Beta-carotene – color	Propane-1,2-diol alginate – thickener, stabilizer, emulsifier
Gamma-carotene – color	Propionic acid – preservative
Chlorine dioxide – flour treatment agent	Propyl gallate – antioxidant
Chlorine – flour treatment agent	Propylene glycol – humectant
Chlorophylls and Chlorophyllins – color (green)	Propylene glycol alginate – thickener, stabilizer, emulsifier
Chocolate Brown HT – color	Propylene glycol esters of fatty acids – emulsifier
Choline salts and esters – emulsifier	Propylparaben (propyl para-hydroxybenzoate) – preservative
Chrysoine resorcinol – color (red)	Pyridoxine hydrochloride – used as a vitamin B6 dietary supplement
Citranaxanthin – color	Quinoline Yellow WS – color (yellow and orange) (FDA:
Citric acid – food acid	
Citric acid esters of mono- and diglycerides of fatty acids – emulsifier	
Citrus red 2 – color (red)	
Cochineal – color (red)	
Copper complexes of chlorophylls – color (green)	

<p> Corn syrup – thickener, a sweetener and as a humectant Crocetin – color Crocin – color Crosslinked Sodium carboxymethylcellulose – emulsifier Cryptoxanthin – color Cupric sulfate – mineral salt Curcumin – color (yellow and orange) Cyclamates – artificial sweetener Cyclamic acid – artificial sweetener beta-cyclodextrin – emulsifier Decanoic acid – used as artificial fruit flavoring Dehydroacetic acid – preservative Delta-tocopherol(synthetic) – antioxidant Dextrin roasted starch – thickener Diacetyltartaric acid esters of mono- and diglycerides of fatty acids – emulsifier Dicalcium diphosphate – anti-caking agent Dilauryl thiodipropionate – antioxidant Dimethyl dicarbonate – preservative Dimethylpolysiloxane – emulsifier, anti-caking agent Dioctyl sodium sulfosuccinate – emulsifier Diphenyl – preservative Diphosphates – mineral salt, emulsifier Dipotassium guanylate – flavor enhancer Dipotassium inosinate – flavor enhancer Disodium 5'-ribonucleotides – flavor enhancer Disodium ethylenediaminetetraacetate – antioxidant, preservative Disodium guanylate – flavor enhancer Disodium inosinate – flavor enhancer Distarch phosphate – thickener, Distearyl thiodipropionate – antioxidant DL-alpha-tocopherol (synthetic) – antioxidant Dodecyl gallate – antioxidant EDTA – Antioxidant, Chelating Agent Enzymatically hydrolyzed Carboxymethyl cellulose – emulsifier Enzyme treated starch – thickener Epazote (Chenopodium ambrosioides) Epsom salts – mineral salt, acidity regulator, firming agent Erythorbin acid – antioxidant Erythrosine – color (red) (FDA: FD&C Red #3) Erythritol – sweetener Ethyl maltol – flavor enhancer Ethyl methyl cellulose – thickener, emulsifier Ethylparaben (ethyl para-hydroxybenzoate) – preservative Ethylenediamine tetraacetic acid – preservative and stabilizer Fast green FCF – color (FDA: FD&C Green #3) Flavoxanthin – color Ferric ammonium citrate – food acid Ferrous gluconate – color retention agent Formaldehyde – preservative Formic acid – preservative Fumaric acid – acidity regulator Gamma-tocopherol(synthetic) – antioxidant Gelatin/gelatine – Gelling agent, emulsifier Gellan gum – thickener, stabilizer, emulsifier Glacial Acetic acid – preservative, acidity regulator Glucitol – AKA sorbitol sugar substitute most is made from corn syrup Gluconate – flavor enhancer Glucono delta-lactone – acidity regulator Glucose oxidase – antioxidant Glucose syrup – sweetener Glutamate – acidity regulator Glutamic acid – flavor enhancer Glycerin – humectant, sweetener Glycerol – a humectant, solvent, and sweetener </p>	<p> D&C Yellow #10) Red 2G – color Saccharin – artificial sweetener Scarlet GN – color Shellac – glazing agent Silicon dioxide – anti-caking agent Silver – metallic element used in food coloring Sodium acetate – preservative, acidity regulator Sodium adipate – food acid Sodium alginate – thickener, stabilizer, gelling agent, emulsifier Sodium aluminium phosphate – acidity regulator, emulsifier Sodium aluminosilicate (sodium aluminium silicate) – anti-caking agent Sodium ascorbate – antioxidant (water-soluble) Sodium benzoate – preservative Sodium bicarbonate – mineral salt Sodium bisulfite (sodium hydrogen sulfite) – preservative, antioxidant Sodium carbonate – mineral salt Sodium carboxymethylcellulose – emulsifier Sodium citrates – food acid Sodium dehydroacetate – preservative Sodium erythorbate – antioxidant Sodium erythorbin – antioxidant Sodium ethyl para-hydroxybenzoate – preservative Sodium ferrocyanide – anti-caking agent Sodium formate – preservative Sodium fumarate – food acid Sodium gluconate – stabiliser Sodium hydrogen acetate – preservative, acidity regulator Sodium hydroxide – mineral salt Sodium lactate – food acid Sodium malates – food acid Sodium metabisulfite – preservative, antioxidant, bleaching agent Sodium methyl para-hydroxybenzoate – preservative Sodium nitrate – preservative, color fixative Sodium nitrite – preservative, color fixative Sodium orthophenyl phenol – preservative Sodium propionate – preservative Sodium propyl para-hydroxybenzoate – preservative Sodium sorbate – preservative Sodium stearyl lactylate – emulsifier Sodium succinates – acidity regulator, flavor enhancer Sodium salts of fatty acids – emulsifier, stabiliser, anti-caking agent Sodium sulfite – mineral salt, preservative, antioxidant Sodium sulfite – preservative, antioxidant Sodium tartrates – food acid Sodium tetraborate – preservative Sorbic acid – preservative Sorbitan monolaurate – emulsifier Sorbitan monooleate – emulsifier Sorbitan monopalmitate – emulsifier Sorbitan monostearate – emulsifier Sorbitan tristearate – emulsifier Sorbitol – humectant, emulsifier, sugar substitute most is made from corn syrup Starch sodium octenylsuccinate – thickener Stearic acid – anti-caking agent Stearyl tartarate – emulsifier Succinic acid – food acid </p>
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<p>Glyceryl distearate – emulsifier Glyceryl monostearate – emulsifier Glycine – flavor enhancer Gold – metallic element used as a food color Green S – color (green) Guanylic acid – flavor enhancer Gum arabic / Gum acacia / E414 – thickener, stabilizer, emulsifier Gum guaiacum – preservative Helium – propellant Heptyl p-hydroxybenzoate – preservative Hexamine (hexamethylene tetramine) – preservative Hexyl acetate – used as a flavoring agent High fructose corn syrup – used in most processed and unhealthy foods and especially in candy, sodas, and other junk foods, it is one of several artificial sweeteners that has replaced the natural once widely consumed sucrose or table sugar. Hydrochloric acid – acidity regulator Hydroxypropyl cellulose – thickener, emulsifier Hydroxypropyl distarch phosphate – thickener Hydroxypropyl methylcellulose – thickener, emulsifier Hydroxypropyl starch – thickener Indanthrene blue RS – color (blue) Indigo carmine – color (blue) (FDA: FD&C Blue #2) Indigotine – color (blue) (FDA: FD&C Blue #2) Inosinic acid – flavor enhancer Invert sugar – modified sugar additive similar to high fructose corn syrup. Iron ammonium citrate – acidity regulator Iron oxides and hydroxides – color Isobutane – propellant Isomalt – humectant Isopropyl citrates – antioxidant, preservative L-cysteine – flour treatment agent Lactic acid – acidity regulator, preservative, antioxidant Lactic acid esters of mono- and diglycerides of fatty acids – emulsifier Lactitol – humectant Lactylated fatty acid esters of glycerol and propylene glycol – emulsifier</p>	<p>Sucralose – artificial sweetener Sucroglycerides – emulsifier Sucrose acetate isobutyrate – emulsifier, stabiliser Sucrose esters of fatty acids – emulsifier Sulfur dioxide – preservative, antioxidant Sulfuric acid – acidity regulator Sunset Yellow FCF – color (yellow and orange) (FDA: FD&C Yellow #6) Talc – anti-caking agent, once widely used in baby powder until it was implicated with ovarian cancers Tannins – color, emulsifier, stabiliser, thickener Tartaric acid esters of mono- and diglycerides of fatty acids – emulsifier Tartrazine – color (yellow and orange) (FDA: FD&C Yellow #5) Tert-butylhydroquinone – antioxidant Tetrahydrocannabinol- flavor enhancer, potent anti-carcinogen Thaumatococcus – flavor enhancer, artificial sweetener Thiabendazole – preservative Thiodipropionic acid – antioxidant Stannous chloride – color retention agent, antioxidant Titanium dioxide – color (white) Triacetin – humectant Triammonium citrate – food acid Triethyl citrate – thickener, Triethyl citrate is also used as a plasticizer for polyvinyl chloride (PVC) and similar plastics. Triphosphates – mineral salt, emulsifier sodium phosphates – Mineral Salt Violaxanthin – color Xylitol – humectant, stabiliser Yellow 2G – color (yellow and orange) Zeaxanthin – color Zinc acetate – flavor enhancer</p>
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

To see the reality of the current food sources and the results of the mass scale consumption of meat and dairy products which *Homo sapiens* are engaged in, while a government encourages this gluttonous behavior, one need only watch the documentary films and news programs: *'Earthlings'* by: Shaun Monson 2005, *'Our Daily Bread'* by: Nikolaus Geyrhalter 2005, *'Fat Sick and Nearly Dead'* by: Joe Cross 2010, *'Food Inc.'* by: Robert Kenner 2008, *'Food Matters'* by: James Colquhoun and Carlo Ledesma 2008, *'Forks Over Knives'* by: Lee Fulkerson 2011, *'Hungry for Change'* by: Laurentine Ten Bosch and James Colquhoun 2012, *'Supersize Me'* by: Morgan Spurlock 2004, *'Vedicated'* by: Marisa Miller Wolfson 2011, *'The Future of Food'* by: Deborah Koons Garcia 2004, *'Cowspiracy: The Sustainability Secret'* by: Kip Andersen and Keegan Kuhn 2014, and the PBS Frontline reports: *'The Trouble with Chicken'* May 12, 2015 and *'The Trouble with Antibiotics'* October 14, 2014, and VICE season 4 episode 5 *'Meathooked & End of Water'*. Or for a more in-depth analysis from an inside medical perspective one can read *'The China Study'* 2006 by: Dr. T. Colin Campbell, Ph.D. and Thomas M. Campbell.

TABLE 2.2. Top 25 Sources of Calories Among Americans Ages 2 Years and Older, NHANES 2005–2006^a

Rank	Overall, Ages 2+ yrs (Mean kcal/d; Total daily calories = 2,157)	Children and Adolescents, Ages 2–18 yrs (Mean kcal/d; Total daily calories = 2,027)	Adults and Older Adults, Ages 19+ yrs (Mean kcal/d; Total daily calories = 2,199)
1	Grain-based desserts ^b (138 kcal)	Grain-based desserts (138 kcal)	Grain-based desserts (138 kcal)
2	Yeast breads ^c (129 kcal)	Pizza (136 kcal)	Yeast breads (134 kcal)
3	Chicken and chicken mixed dishes ^d (121 kcal)	Soda/energy/sports drinks (118 kcal)	Chicken and chicken mixed dishes (123 kcal)
4	Soda/energy/sports drinks ^e (114 kcal)	Yeast breads (114 kcal)	Soda/energy/sports drinks (112 kcal)
5	Pizza (98 kcal)	Chicken and chicken mixed dishes (113 kcal)	Alcoholic beverages (106 kcal)
6	Alcoholic beverages (82 kcal)	Pasta and pasta dishes (91 kcal)	Pizza (86 kcal)
7	Pasta and pasta dishes ^f (81 kcal)	Reduced fat milk (86 kcal)	Tortillas, burritos, tacos (85 kcal)
8	Tortillas, burritos, tacos ^g (80 kcal)	Dairy desserts (76 kcal)	Pasta and pasta dishes (78 kcal)
9	Beef and beef mixed dishes ^h (64 kcal)	Potato/corn/other chips (70 kcal)	Beef and beef mixed dishes (71 kcal)
10	Dairy desserts ⁱ (62 kcal)	Ready-to-eat cereals (65 kcal)	Dairy desserts (58 kcal)
11	Potato/corn/other chips (56 kcal)	Tortillas, burritos, tacos (63 kcal)	Burgers (53 kcal)
12	Burgers (53 kcal)	Whole milk (60 kcal)	Regular cheese (51 kcal)
13	Reduced fat milk (51 kcal)	Candy (56 kcal)	Potato/corn/other chips (51 kcal)
14	Regular cheese (49 kcal)	Fruit drinks (55 kcal)	Sausage, franks, bacon, and ribs (49 kcal)
15	Ready-to-eat cereals (49 kcal)	Burgers (55 kcal)	Nuts/seeds and nut/seed mixed dishes (47 kcal)
16	Sausage, franks, bacon, and ribs (49 kcal)	Fried white potatoes (52 kcal)	Fried white potatoes (46 kcal)
17	Fried white potatoes (48 kcal)	Sausage, franks, bacon, and ribs (47 kcal)	Ready-to-eat cereals (44 kcal)
18	Candy (47 kcal)	Regular cheese (43 kcal)	Candy (44 kcal)
19	Nuts/seeds and nut/seed mixed dishes ^j (42 kcal)	Beef and beef mixed dishes (43 kcal)	Eggs and egg mixed dishes (42 kcal)
20	Eggs and egg mixed dishes ^k (39 kcal)	100% fruit juice, not orange/grapefruit (35 kcal)	Rice and rice mixed dishes (41 kcal)
21	Rice and rice mixed dishes ^l (36 kcal)	Eggs and egg mixed dishes (30 kcal)	Reduced fat milk (39 kcal)
22	Fruit drinks ^m (36 kcal)	Pancakes, waffles, and French toast (29 kcal)	Quickbreads (36 kcal)
23	Whole milk (33 kcal)	Crackers (28 kcal)	Other fish and fish mixed dishes ⁿ (30 kcal)
24	Quickbreads ^o (32 kcal)	Nuts/seeds and nut/seed mixed dishes (27 kcal)	Fruit drinks (29 kcal)
25	Cold cuts (27 kcal)	Cold cuts (24 kcal)	Salad dressing (29 kcal)

SOURCE: USDA - Dietary Guidelines for Americans 2010 - <https://health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf>

What does it mean when the number 1 and 10 calorie sources for American adults are deserts, and the number 6 source is alcohol, not a food but a poison, while the vast majority of the other sources are unhealthy processed foods, and not one natural healthy fruit- or vegetable-based item? Is there any wonder that Americans are going through an obesity epidemic and have other chronic health issues? Why is the number 6 calorie source alcohol, are they stressed, angry, or depressed and attempting to silence a pain with something that gives them temporary relief? Are they addicted to indulgence? Are they following the patterns of behavior set for them by portions of the entertainment industry, friends, parents, or other mentors? Why are all these unhealthy food products being consumed in such vast quantities? Could it have to do with them being more prevalent at most restaurants and grocery stores? Could it be that these products are what is marketed to consumers by the food companies and even recommended by pseudo experts of nutrition that create the recommended daily allowances (RDAs) which so many consumers follow? Dr. T. Colin Campbell, Ph.D., a former panel member, explains in detail how the Food and Nutrition Board (FNB) has turned the RDAs into a corrupt and unreliable system with devastating consequences,

“The Food and Nutrition Board (FNB), as part of the Institute of Medicine (IOM) of the National Academy of Sciences, has the responsibility every five years or so to review and update the recommended consumption of individual nutrients. The FNB has been making nutrient recommendations since 1943 when it established a plan for the U.S. Armed Forces wherein it recommended daily allowances (RDAs) for each individual nutrient”

“The second panel member, a long-time friend and colleague, was a subcommittee chair during the latter part of the panel's existence. He is not a nutritional scientist and also was surprised to hear my concerns about the upper limit for protein. He did not recall much discussion on the topic either. When I reminded him of some of the evidence linking high-animal protein diets to chronic disease, he initially was a little defensive. But with a little more persistence on my part about the evidence, he finally said, “Colin, you know that I really don't know anything about nutrition.” How then was he a member-let alone the chair-of this important subcommittee? *And it gets worse.* The chair of the standing committee on the evaluation of these recommendations left the panel shortly before its completion for a senior executive position in a very large food company-a company that will salivate over these new recommendations.”

“Almost all of the wide-ranging effects of this 2002 FNB report will be profoundly harmful. In school, our children can be fed more fat, more meat, more milk, more animal protein and more sugar. They will also learn that this food is consistent with good health. The ramifications of this are serious, as a whole generation will walk the path of obesity, diabetes and other chronic illnesses, all the while believing that they are doing the right thing.” (109)

For many westerners, their food source is that of fast food which is often marketed as delicious, healthy, and inexpensive, but it is in fact highly processed, mass produced, very unhealthy, and expensive. Although there is ‘*Smoothie King*’ founded in 1973 and ‘*Veggie Grill*’ established in 2006, there are no mainstream fast food chains which base their menu solely around healthy fresh plant-based ingredients, instead menu items use mainly fauna-based ingredients. And although there are a few vegan options when eating at some of the smaller restaurants and fast food chains which specialize in cultural and regional cuisines, perhaps one day there will be more ‘*Veganurants*’ or even more vegan options on mainstream fast food menus. In the United States, there are 131,624 mainstream fast food chain locations in addition to the thousands of smaller chains or independent knock-offs, and globally locations are increasing rapidly. For instance, McDonald’s had 2,500 China locations in 2017 and recently announced that by the end of 2022 they expect to increase the number to 4,500 restaurants. (481) It should also be noted, that in addition, there are 4,130 fast food trucks (127) and 154,195 convenient stores (125) which also operate in the United States, most of which offer some type of fast food either precooked or microwavable, and is usually even more unhealthy than their fast food restaurant counterparts. There are also thousands of vending machines which mainly offer unhealthy food and drink items for an exorbitant price.

U.S. Fast Food Franchises	
Franchise	Worldwide Locations in 2017
Subway	44,818
McDonald’s	36,525
Starbucks	23,768
KFC Corp.	19,420
Burger King	15,000
Pizza Hut Inc.	13,728
Dunkin' Donuts	11,000
Dominos Pizza	8,200
Wendy’s	6,490
Taco Bell	6,407
Hardee's	5,812
Dairy Queen	4,800
Papa John’s	4,700
Sonic	3,526
Arby’s	3,342

Jack in the Box	2,200
Popeyes	2,000
Jimmy Johns Gourmet Sandwiches	1,954
A&W	1,200
Krispy Kreme	1,003
Bojangles'	600
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Biotechnological Food

Some of the methods being practiced to modify agricultural crops resulting in increased yields, resistance to pestilence, and to adjust for climate conditions are: genetic modification, inter-species crossing, marker-assisted selection, mutation breeding, or traditional breeding. Some are under the impression that modifying the food sources themselves with technology will solve the health issues which are being created from an unhealthy diet. Instead of working with nature these methods in fact work against it, and the solution to many of the problems that are trying to be corrected are easily found in simple dietary changes, and not changing the foods themselves.

In 2014, sales of products labeled as non-genetically modified organisms (non-GMO) grew 30% to more than \$1,100,000,000, (42) an increase which may be a result of the public's non-acceptance of GMO products. There seems to be a general negative consensus and fear towards genetically modified foods from most of the public, but ironically most *Homo sapiens* have been unknowingly consuming some type of modified food for the last 50 years, either modified through genetics or through the use of fertilizers and pesticides. In 2017, the USDA estimated that 94% of soybeans are genetically modified to be herbicide-tolerant (HT), and 89% of domestic corn are also produced with HT seeds. As of 2015, more than 81% of domestic corn has also been genetically modified to contain genes from the soil bacterium *Bacillus thuringiensis*. (575) After an outbreak of papaya ringspot virus in the early 1990s, a genetically modified papaya was created to resist the virus, today more than 80% of Hawaiian papaya is genetically modified. (691) So why is the public so unwilling to accept GM Foods? The Institute of Medicine and National Research Council in 2004 stated,

"Adverse health effects from genetic engineering have not been documented in the human population, but the technique is new and concerns about its safety remain." (41)

Could a negative side-effect from genetic modification directly affect *Homo sapiens* health in the future? How will the susceptibility to genetic erosion or genetic homogeneity affect GM food crops over time? Is there a real need to modify food crops in the first place? Could all the food needed for consumption be grown with the tools of nature and in a more organic natural manner without all the synthetic unnatural pesticides, fertilizers, additives, hormones, antibiotics, or genetic modifications? Could these added hormones be causing precocious puberty in some *Homo sapiens*? In the October 2014 National Geographic Magazine Tim Folger reported that,

"First released in the 1990s, they've been adopted by 28 countries and planted on 11 percent of the world's arable land, including half the cropland in the U.S. About 90 percent of the corn, cotton, and soybeans grown in the U.S. are genetically modified. Americans have been eating GM products for nearly two decades. But in Europe and much of Africa, debates over the safety and environmental effects of GM crops have largely blocked their use."

Proponents like Fraley say such crops have prevented billions of dollars in losses in the U.S. alone and have actually benefited the environment. A recent study by the U.S. Department of Agriculture found that pesticide use on corn crops has dropped 90 percent since the introduction of Bt corn, which contains genes from the bacterium *Bacillus thuringiensis* that help it ward off corn borers and other pests. Reports from China indicate that harmful aphids have decreased—and ladybugs and other beneficial insects have increased—in provinces where GM cotton has been planted."

"The particular GM crops Fraley pioneered at Monsanto have been profitable for the company and many farmers, but have not helped sell the cause of high-tech agriculture to the public. Monsanto's Roundup Ready crops are genetically modified to be immune to the herbicide Roundup, which Monsanto also manufactures. That means farmers can spray the herbicide freely to eliminate weeds without damaging their GM corn, cotton, or soybeans. Their contract with Monsanto does not allow them

to save seeds for planting; they must purchase its patented seeds each year.

Modern agriculture, they say, already relies too heavily on synthetic fertilizers and pesticides. Not only are they unaffordable for a small farmer like Juma; they pollute land, water, and air. Synthetic fertilizers are manufactured using fossil fuels, and they themselves emit potent greenhouse gases when they're applied to fields."

"The choice is clear," says Hans Herren, another World Food Prize laureate and the director of Biovision, a Swiss nonprofit. "We need a farming system that is much more mindful of the landscape and ecological resources. We need to change the paradigm of the green revolution. Heavy-input agriculture has no future—we need something different." There are ways to deter pests and increase yields, he thinks, that are more suitable for the Jumas of this world."

A GM crop is by no means the fix all answer to food pestilence, a growing population, or climate conditions, the technology is still susceptible to evolution and the other processes, forces, and laws of nature. Already corn rootworms have evolved resistance to the bacterial toxins in GM Bt corn. In the May 2015 National Geographic Magazine Rachel Hartigan Shea reported that,

"Using a technique called RNA interference (RNAi), scientists have silenced genes that lead potatoes to bruise and to brown when exposed to air—the two characteristics that land roughly 30 percent of harvested potatoes in the trash. These new spuds also contain up to 70 percent less of an amino acid that transforms into a cancer-causing compound at high temperatures. A second version will be resistant to late blight, the disease that caused the Irish potato famine."

AquaAdvantage salmon, the first genetically modified salmon was deemed safe for consumption in 2010 and will be available as soon as labeling guidelines from the FDA have been mandated. And in 2006, Hematech, Inc. announced it had used genetic engineering and cloning technology to produce cattle that lacked a necessary gene for prion production, theoretically making them immune to Mad Cow Disease which has resulted in the deaths of millions of cattle worldwide. Is it acceptable to use science techniques to modify food in such ways? One can see many benefits, but will consumers accept a food that has been altered in such a way? Could GMOs have adverse side effects on natural unmodified flora and fauna? Wouldn't a simpler solution be to not fry potatoes and not worry so much about aesthetics? Does the onion really need to be genetically modified so that *Homo sapiens* eyes don't water when they are cut? Must companies resort to genetically engineering wheat and rice to resemble seaweed in order to grow on soil that has been overtaxed and become saline? Can we not maintain the soils with natural husbandry techniques, and instead grow a natural unmodified food crop? Would it not be wiser for *Homo sapiens* to alter their lifestyles and mentalities, rather than modifying the food sources to suit a negative lifestyle and mentality?

Is all this modification of nature necessary, or could the solution to the agricultural dilemma be to simply better understand and work with nature allowing the natural processes, forces, and laws of nature to help, instead of working hopelessly against it? Many *Homo sapiens* tend to forget that nature does things far better than *Homo sapiens* do, and in fact some things that *Homo sapiens* have perfected technologically have been based on some natural design. Continuing to work against nature in the future could result in a cycle of similar problems the agricultural industry is encountering today. Nature has far more experience than *Homo sapiens* and has been using evolution along with other processes, forces, and laws to create perfect food for every living creature on Earth for billions of years, and this system works in perfect harmony if left alone. Would *Homo sapiens* not be wiser to use this experience to their advantage and follow the example set by nature instead of trying to reinvent and attempt to control nature?

Meat, Dairy, and Egg Consumption

Some paleobiologist and paleoanthropologist have postulated that eating meat led to the development of the human brain, and that without eating meat humans would not be as intelligent as they are today. This view is used by some proponents who advocate eating meat based on the erroneous belief that *Homo sapiens* must consume a diet of 50% or more of meat, and that if *Homo sapiens* stop eating meat they will become less intelligent. In the September 2014 issue of National Geographic Magazine paleobiologist Amanda Henry said,

"There's been a consistent story about hunting defining us and that meat made us human, frankly, I think that misses half of the story. They want meat, sure. But what they actually live on is plant foods."

Furthermore, in the same National Geographic Magazine when describing modern day indigenous *Homo sapiens* Ann Gibbons said,

"The Hadza get almost 70 percent of their calories from plants. The Kung traditionally rely on tubers and mongongo nuts, the Aka and Baka Pygmies of the Congo River Basin on yams, the Tsimane and Yanomami Indians of the Amazon on plantains and manioc, the Australian Aboriginals on nut grass and water chestnuts."

And although salmon, deer, seafood, and other wild game were eaten by the indigenous which inhabited California, their diet consisted of many flora species and even some insects, grubs, and worms. Theodora Kroeber in describing the California indigenous diet writes,

"The great staple food of the California Indian was acorn flour made into mush or bread. The acorn, of which some half dozen or more edible varieties were recognized, meant to Indians what rice means to Cantonese Chinese, or maize to Mexicans...Pine nuts, hazel nuts, buckeye, manzanita berries, wild raspberry, huckleberry, plum, grape, elderberry, barberry, and thimbleberry were enjoyed in season, and some of them were dried and stored. There were sage and tarweed and clarkia seeds, and a host of other seeds small and large and, in season, the earth-oven roasted roots of the camas, annis, tiger lily, and brodiaea were a welcome addition. Certain grubs and worms were roasted as delicacies; also grasshoppers as in modern Mexico." (96)

Even more prolific is the erroneous mainstream belief that consuming meat and dairy products are healthy, and that one will be bigger and stronger by consuming them. Some use the excuse that *Homo erectus* began hunting around 1,800,000 years ago, and even *Homo sapiens* themselves have been consuming meat for more than 200,000 years, but again modern-day *Homo sapiens* have far more knowledge and alternatives their primitive ancestors didn't have. Others justify consuming faunae in that there are other predator species in the wild which hunt, kill, and consume other fauna species. Yes, there are predators in nature which hunt and eat other species, and yes this keeps a balance, but there is far more coexistence in nature which is not focused on. To use this to justify eating faunae is irrational, as *Homo sapiens* have far more intelligence than a lion and have a choice at this point in their evolution, whereas a lion has evolved this way and has no choice. If one compares the physical features of *Homo sapiens* with carnivores, they can easily see that *Homo sapiens* do not have fangs or claws for killing and ripping apart flesh, but in fact have the exact opposite with teeth and hands made for harvesting and consuming flora. *Homo sapiens* can't digest raw meat like carnivores do, as it contains disease-carrying pathogens which will make *Homo sapiens* extremely ill and can even cause death. *Homo sapiens* do not have the same digestive system as carnivores do, and in fact have a longer intestine which is a trait found in herbivores. If one also looks at other predators and most all other faunae, they do not suffer from medical issues as a result of consuming meat, medical issues which are prevalent only in *Homo sapiens*. (e.g. obesity, diabetes, high blood pressure, cardiovascular disease, chronic kidney disease, strokes, various cancers, etc.) *Homo sapiens* are not predators, and without tools to hunt with and fire to cook, meat is not naturally feasible to acquire and consume. Flora are the exact opposite in that it is easily obtainable, and almost always edible in its raw form. The vast majority of Earth's fauna species are vegan and most of the carnivorous species are not predators, they are in fact scavengers and do not kill anything, but rather wait until it dies naturally and then consume the carrion. They are really doing nothing more than cleaning the Earth of its inevitable victims of death.

As most anyone will attest to, fresh food is always not only more tasting, but also more nutritional. Most meat is several months old by the time it even reaches the consumer, and dairy and eggs are also not fresh. Meat, dairy, and eggs all require refrigeration because they spoil very rapidly, and in addition, eggs and meat must also be cooked at very high temperatures in order to kill disease-carrying pathogens and consume it safely. What does this say about the natural edibility of these products for *Homo sapiens*? The majority of *Homo sapiens* around the world today do not eat vast quantities of meat from cows, chickens, or pigs as it is not readily available, or they are too poor to afford it, when and if they do consume meat it is on rare occasions and in very small quantities. In most parts of India, the cow is in fact sacred and not eaten. A 2003 report by the Food and Agriculture Organization of the United Nations report stated,

"The second major factor limiting the growth of world meat consumption is the fact that such consumption is heavily and disproportionately concentrated in the industrial countries. They account for 15 percent of world population but for 37 percent of world meat consumption and 40 percent of that of milk." (131)

Vegetarianism is nothing more than the erroneous notion that by not killing and eating faunae it somehow justifies the continual exploitation of faunae through the consumption of eggs and dairy. How can vegetarians proclaim their love of faunae and advocate for fauna rights while still exploiting the fauna for either their milk, eggs, feathers, skins, or labor? From the easily visible negative impact on consumer health and the environment, in conjunction with a basic set of morals toward other sentient faunae, one would think that vegan logic would prevail in the carnivore argument. *Homo sapiens* can sustain life without faunae as a source of food, so why don't they? Have most *Homo sapiens* simply not developed enough intellectually and morally to see how illogical it is to dominate, exploit, and consume faunae?



SOURCE: USDA - photos K3839-3 and K3627-16 by: Keith Weller and photo K7623-1 by: Scott Bauer. Which picture looks not only more appetizing but takes less effort to prepare and consume? Which pictures feels pain, stress, and other emotions?

The meat, egg, and dairy industry along with omnivorous consumers have proliferated on a global scale the spread of disease, environmental destruction, and the abuse and slaughter of billions of cows, chickens, goats, bison, snakes, sharks, whales, birds, and other faunae all in the name of tradition and profits. Perhaps if *Homo sapiens* would inquire more about their meat sources they could see the brutality and inhumane treatment their commercial meat sources endure daily on a mass scale. Some of the things *Homo sapiens* consume are beyond comprehension when one looks at the natural intentions of the product. (e.g. milk, eggs, flesh, feet, snouts, spleens, tongues, lips, and a wide range of animal organs such as hearts, livers, brains, etc.) Isaac Singer wrote,

"As often as Herman had witnessed the slaughter of animals and fish, he always had the same thought: in their behavior toward creatures, all men were Nazis. The smugness with which man could do with other species as he pleased exemplified the most extreme racist theories, the principle that might is right." (612)

Although there is insufficient scientific evidence to prove a cause-and-effect relationship between probiotics and any health benefits, companies still market them as such which ultimately results in many consumers being misled into consuming them unnecessarily. In addition, because of vast marketing campaigns by the dairy

industry, many *Homo sapiens* have the false notion that you must eat probiotic rich dairy foods to maintain health and must also drink milk to get vitamin D to maintain healthy bones. Probiotics are added to products like yogurt in attempt to promote more of a healthy product, and most buy into this marketing scheme not realize that yeast obtained by when eating naturally baked goods is sufficient. “*Milk does the body good*” and “*Got Milk?*” are some of the most famous tag-lines, and the dairy industry has even used celebrities to market milk and other dairy products as healthy and as the best source for vitamin D and calcium. But it does not do the body good and in fact it is very harmful, while there are other far more healthier sources to obtain vitamin D and calcium. Few know or even realize that vitamin D is not a vitamin that needs to be consumed and in fact around 1 hour of sunlight exposure per week will allow *Homo sapiens* bodies to make all that it needs internally, no milk or dairy is needed, just natural sunshine.

In addition, the majority of adults in the world produce low levels of lactase and are not naturally capable of digesting dairy products. The lactase enzyme is present in all children, but as they stop breast feeding there is no reason for the enzyme and it weakens unless the child is forced to consume dairy products. The majority of adults with high levels of lactase are from regions in the world like Europe and American with a history of raising dairy animals. 75% of all African-Americans and Native-Americans as well as 90% of all Asian-Americans are lactose intolerant. (219) So logically speaking from an evolutionary standpoint *Homo sapiens* are not designed to digest milk for their entire lifespan, only for the early initial development stage, and with breastmilk, not cow’s milk. While Americans now drink 37% less milk than in 1970, (347) China, a previously non-dairy consuming nation, has quickly become a new consumer market for milk in recent years increasing the global milk demand.

There are far healthier alternative flora-based milk sources available derived from almonds, soy, rice, oat, quinoa, hemp, coconuts, and other floras which are cholesterol free and contain even more vitamins and minerals than fauna based dairy products. They are all natural and produce a much smaller carbon footprint during the manufacturing process than milk which comes from cows or other faunae. In addition, almonds, soy, rice, oat, quinoa, hemp, coconuts, and other floras contain less fat and are more nutritional and healthier. Almond, soy, rice, oat, quinoa, hemp, coconut, and other flora-based milks also do not spoil as quickly and thus can be consumed over a longer period. Ironically, high dairy consumption has been linked to higher rates of osteoporosis and not lower, and yet the dairy industry has marketed the idea that mass milk consumption leads to stronger bones. This erroneous claim can be seen in the scientific evidence that the consumption of fauna protein creates metabolic acidosis, as a defense mechanism the body uses calcium in the bones to neutralize the metabolic acidosis, resulting in osteoporosis. Changing the consumption of regular whole dairy products to low fat or even non-fat dairy products does not have any results on this condition.

Unfortunately for faunae, the health of the *Homo sapiens* who consume them, and the Earth that bears the scars from the livestock industry, meat and dairy consumption is on the rise, especially the meat of chickens. American meat consumers are consuming less red meat, appearing to have learned a valuable nutritional lesson in recent decades about the fatal side effects of beef consumption in gluttonous amounts. Unfortunately for consumers, and like so many other industries in recent times, corporations have consolidated smaller operations and created a monopoly over the meat supply. In the November 2014, National Geographic Magazine Robert Kunzig reported that,

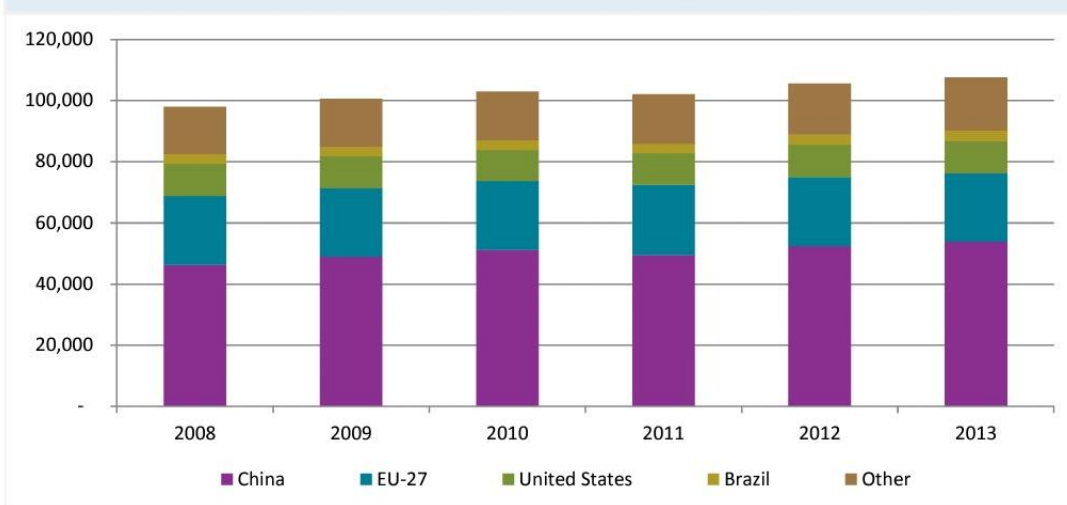
"In 1976 per capita beef consumption peaked in the United States at 91.5 pounds a year. It has since fallen more than 40 percent. Last year Americans ate on average 54 pounds of beef each, about the same amount as a century ago. Instead we eat twice as much chicken as we did in 1976 and nearly six times as much as a century ago.

...today 82 percent of U.S. beef passes through plants that process thousands of cattle a day and are owned by just four corporations."

Worldwide, billions of cows, chickens, and pigs are consumed each year, and although there are no complete worldwide statistics available as to exactly how many have been consumed in just the last 100 years, one can get a general idea of how enormous the scale is in which these faunae are being consumed globally. During 2015 in the United States alone, 28,800,000 cows, 452,600 calves, 115,400,000 pigs, 2,220,000 sheep and lambs,

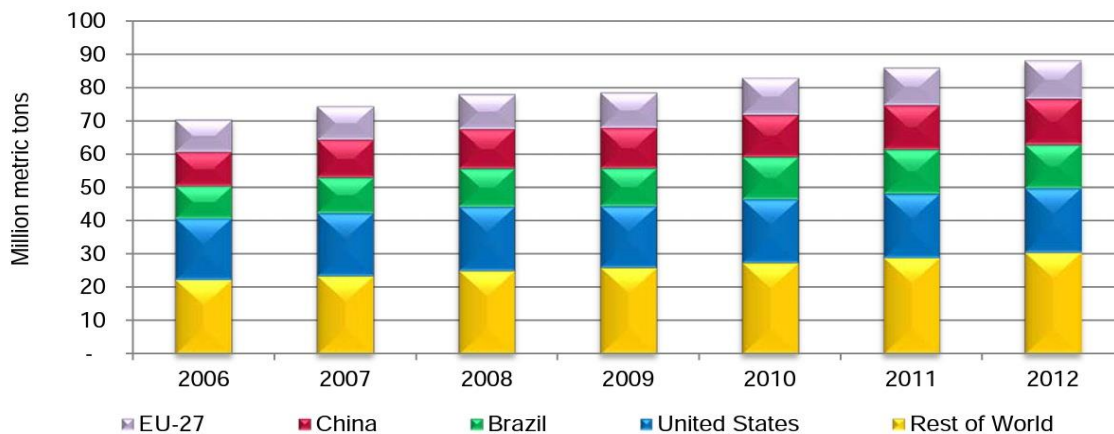
8,822,695,000 chickens, 232,398,000 turkeys, and 27,749,000 ducks (132) (133) (134) were federally inspected and slaughtered for consumption. Globally more than 1,200,000,000,000 eggs were produced for consumption in 2014. (475) In 2013, the worldwide production of milk was 275,302,000,000 gallons. (188) It should also be factored in that millions of individuals worldwide also maintain livestock for personal consumption and exploitation, and these faunae are not federally inspected nor included in any statistical data.

Figure 8 Global pork production, 2008–13 (thousand metric tons, carcass-weight equivalent)



Source, USDA, FAS, Production, Supply, and Distribution database (accessed October 28, 2013).

FIGURE 8 Global production of poultry meat was highly concentrated in 2006–12



Source USDA, FAS, PSD Online database, (accessed August 20, 2013).

Beef and Veal Selected Countries Summary
1,000 Metric Tons (Carcass Weight Equivalent)

	2012	2013	2014	2015	2016 Oct	2016 Apr
Production						
Brazil	9,307	9,675	9,723	9,425	9,600	9,620
European Union	7,708	7,388	7,443	7,670	7,560	7,680
China	6,623	6,730	6,890	6,700	6,785	6,785
India	3,491	3,800	4,100	4,100	4,500	4,300
Argentina	2,620	2,850	2,700	2,740	2,680	2,680
Australia	2,152	2,359	2,595	2,547	2,300	2,180
Mexico	1,821	1,807	1,827	1,850	1,865	1,865
Pakistan	1,587	1,630	1,675	1,725	1,775	1,775
Russia	1,380	1,380	1,370	1,355	1,300	1,310
Canada	1,060	1,049	1,099	1,050	975	1,065
Others	8,940	9,063	9,232	8,412	8,467	8,413
Total Foreign	46,689	47,731	48,654	47,574	47,807	47,673
United States	11,848	11,751	11,076	10,815	11,389	11,328
Total	58,537	59,482	59,730	58,389	59,196	59,001

SOURCE: United States International Trade Commission and United States Department of Agriculture

In the May 2014 issue of National Geographic Magazine, Jonathan Foley stated,

“Agriculture is among the greatest contributors to global warming, emitting more greenhouse gases than all our cars, trucks, trains, and airplanes combined—largely from methane released by cattle and rice farms, nitrous oxide from fertilized fields, and carbon dioxide from the cutting of rain forests to grow crops or raise livestock.

The spread of prosperity across the world, especially in China and India, is driving an increased demand for meat, eggs, and dairy, boosting pressure to grow more corn and soybeans to feed more cattle, pigs, and chickens. If these trends continue, the double whammy of population growth and richer diets will require us to roughly double the amount of crops we grow by 2050.”

If eating meat causes more environmental damage than driving an oil powered automobile, would not the most logical action be to encourage more individuals to consume less meat and not more? Will this proliferation of meat eating offset the positive reductions in greenhouse gas emissions from other sources? How long will it take developing countries to realize the devastating health and environmental consequences of this new deadly diet? What if western civilizations had taken a more vegan path, would the developing countries be following this example instead? Does eating faunae really symbolize that a civilization is modern, powerful, wealthy, and prosperous? Why do so many oppose harming faunae, and yet eat them? Will morbid carnivorous symbols ever end, like the National Thanksgiving Turkey Presentation which pardons one turkey while millions of other turkeys are consumed?

Faunae produce an enormous amount of feces during the entire livestock process and consume vast amounts of water. Around 90% of fresh water consumed on the planet by *Homo sapiens* is for agricultural and livestock purposes, with livestock consuming larger volumes of water than flora crops. The amount of water consumption when producing meat and dairy products is enormous when compared with the water footprint to produce fruits and vegetables. Livestock consume vast quantities of water during the growth phase in addition to the water used during the processing and even consumption phases.

Average Water Consumption for Meat and Dairy Production	
Meat / Dairy Product	Gallons of Water Required
2.2 lbs of Pork	1,582
2.2 lbs of Beef	4,068
2.2 lbs of Cheese	1,336
2.2 lbs of Chicken	1,143
12 Chicken Eggs	636
2.2 Gallons of Cow's Milk	269
2.2 lbs of Leather from a Cow	4,490
Average Water Consumption for Fruit and Vegetable Production	
Fruit / Vegetable Product	Gallons of Water Required

2.2 lbs of Tomatoes	57
2.2 lbs of Apples	217
2.2 lbs of Bananas	208
2.2 lbs of Cucumbers	93
2.2 lbs of Lettuce	62
2.2 lbs of Corn	322
2.2 lbs of Mangos	475
2.2 lbs of Oranges	147
2.2 lbs of Peaches	240
2.2 lbs of Potatoes	76
SOURCE: Water Footprint Network – Product Water Footprint - http://www.waterfootprint.org/	

Furthermore, a large portion of the food grown is used to feed meat-based food sources which produce far less calories than the actual food being consumed to create the meat. It is an endless negative cycle of using valuable resources to produce very unhealthy food products. In the May 2014 issue of National Geographic Magazine Jonathan Foley stated,

“It would be far easier to feed nine billion people by 2050 if more of the crops we grew ended up in human stomachs. Today only 55 percent of the world’s crop calories feed people directly; the rest are fed to livestock (about 36 percent) or turned into biofuels and industrial products (roughly 9 percent). Though many of us consume meat, dairy, and eggs from animals raised on feedlots, only a fraction of the calories in feed given to livestock make their way into the meat and milk that we consume. For every 100 calories of grain we feed animals, we get only about 40 new calories of milk, 22 calories of eggs, 12 of chicken, 10 of pork, or 3 of beef.”

Among all the faunae that are raised under cruel conditions and get brutally slaughtered and gutted to be shipped around the world for consumption, the chicken is being consumed in the greatest numbers. According to the October 2014 National Geographic Magazine, the United States exported 2,700,000 tons of unconsumed chicken parts, (e.g. the wings, feathers, leg quarters, viscera, and feet) to the countries of China, Indonesia, South Africa, and Russia. The wretched conditions of confinement that most livestock faunae are exposed to is one of the most inhumane practices that *Homo sapiens* continuously do with government regulators and an omnivorous eating public cynically ignoring the issue. Most consumers are not even aware of the barbaric practices with which the livestock industry handles their food sources. How could one eat meat once they witness the livestock industrial machine? Is not the logical solution to stop using nutritional flora food sources to create other less healthy meat-based food and an unneeded biofuel energy source, and instead simply consume these or other flora-based sources which are naturally nutritional foods and utilize the clean energy of the Sun and wind?

Do most consumers even know where the meat they’re consuming originated from and how old it truly is? In June 2015, Chinese authorities seized more than 100,000 tonnes of smuggled meat, some of which was more than 40 years old. (340) And in March 2017, more than 1,000 Federal Police of Brazil, the world’s largest red meat exporter, launched ‘*Operation Carne Fraca*’ raiding 194 meat production facilities of 30 meat companies. The Brazilian meat companies were accused of bribing meat inspectors, exporting rotten meat, using acid and other sometimes carcinogenic chemicals to mask the smell of the rotten meat, altering dates of meat expiration, and of adding potato, water, and even cardboard to chicken meat in an effort to increase profits. (341) To maintain the appetizing bright red color and prevent rapid spoilage in most ground beef, beef loin steaks, and pork chops, the meat is packaged in a modified atmosphere using carbon monoxide, nitrogen, oxygen, and high carbon dioxide. (451) In order to kill any bacteria like salmonella, many chickens around the world are rinsed or dipped in an antimicrobial solution of chlorine dioxide, acidified sodium chlorite, trisodium phosphate, and peroxyacids. (528) What does this say about a food source which uses chemicals to maintain an appetizing color, prolong the shelf life, or eliminate deadly bacteria? If meat was allowed to turn the natural color as it is rotting waiting to be purchased, would there be less meat consumption?

It should also be noted that in addition to the mainstream western faunae, (e.g. cows, chickens, pigs, etc.) being consumed there are also millions of donkeys, camels, pigeons, goats, ducks, sheep, snakes, turtles, civets, dogs, cats, rabbits, rats, monkeys, guinea pigs, and other faunae which are slaughtered and sold every day at live animal markets throughout China and in other world food markets for local consumption. Insects are also consumed by many around the world as they cost far less to cultivate, are very nutritional, and have less

environmental impact producing less greenhouse gases and requiring less land use. The September 2014 National Geographic Magazine stated that,

“2 billion people consume more than 2,000 different species of insects worldwide, but this is declining as more people convert to a western diet. The percent of protein and fat in crickets is similar to that of most meats.”

Or perhaps meat of the future will be grown in a factory and not involve actual faunae at all. In 2013, scientists made a hamburger from muscle fibers which were grown from cow stem cells. (215) And in 2016 a company called Perfect Day unveiled that they had created milk using yeast, cow DNA, and plant nutrients. (216) Will the health risks of eating meat and dairy still be ignored even if the moral and environmental concerns are alleviated?

In 2010, 32 diseases caused an estimated 600,000,000 foodborne illnesses cases and 420,000 deaths worldwide. More than 90% of human exposure to dioxins is through food, mainly meat, dairy, fish, and shellfish. (529) Could many of these deaths be easily prevented by simply not consuming meat and dairy products? Alpha-gal allergy is a recently discovered mammalian meat allergy which is caused by certain tick bites. A similar self-inflicted medical condition known as Pork-Cat syndrome was first described in 1994, where some cat owners became allergic to pork after being exposed to cats. Could these emerging medical conditions be nature's evolutionary reaction to *Homo sapiens* mass meat consumption? If more *Homo sapiens* developed a meat allergy would this lead to less meat consumption, or would another medication simply be developed to alleviate the allergy in order to continue meat consumption?

Faunae are also exploited in other ways by *Homo sapiens* to obtain some other foods as well. Tens of thousands of Asian palm civets are exploited daily for their feces in order to create kopi luwak, a coffee which is made with the partially digested coffee cherries eaten and defecated by the Asian palm civet. *Homo sapiens* have been exploiting bees for their honey and beeswax for more than 8,000 years. In 1961 the world had 49,173,473 beehives, by 2016 this number increased to 90,564,654 beehives. (698) If each hive contains an average of 30,000 bees, this would total more than 2,716,939,620,000 bees being exploited every year for their honey. In addition to the stress which bees undergo, some bees are injured or killed from beekeepers haphazardly handling them when harvesting the honey. Some beekeepers also permanently maim the queen bee by clipping away part of her wings with the erroneous notion that this will keep the colony from swarming. Couldn't maple syrup, molasses, coconut nectar, agave nectar, or another flower nectar be used instead? If every consumer had to collect the honey from the hive without protective gear, a bee smoker, or other technology how much less honey would be eaten? Could colony collapse disorder (CCD) have been aggravated from this exploitation?

There will most likely always be omnivorous *Homo sapiens* so long as the unwitting new generations are taught to eat meat by an older generation of omnivores, and while this type of diet is also encouraged by food corporations and even the government itself which is being vastly influenced by these same food corporations. Why do most *Homo sapiens* feel compassion towards some sentient beings their ancestors once exploited or extirpated (e.g. whales, buffalo, wolves, bears, etc.) and then deem others ok to continuously exploit? (e.g. pigs, cows, chickens, etc.) If *Homo sapiens* had to see the fauna born, raise it for years, slaughter it, skin and gut the animal for consumption, would they still eat the cow, pig, chicken, fish, or other fauna? How many more vegans would there be in the world if this was the process in which everyone acquired meat instead of the current blinded reality where it is commercially presented as this final picture perfect, delicious and healthy food that everyone is told they want and need to consume? Would *Homo sapiens* eat a more vegan diet if they were exposed to the reality of the foods which they are consuming, the environmental impacts, the morality issues, and the health effects? What does it say about food and nutritional education when some consumers believe that chocolate milk comes from brown cows or that lean beef comes from skinny cows?

Livestock Antibiotics, Steroids, and Candy

Antibiotics were a revolution in medicine but ultimately the livestock and even medical industries have abused them, and now they may become useless against certain strains of disease as a result of this abuse. At one point

recently, most antibiotics were being used on livestock animals and not on humans. Until 2016, antibiotics were widely used on livestock animals, not to treat disease, but as growth promoters, and the down side to doing this is pathogens could develop a resistance to antibiotics and could potentially be transmitted to humans. Some antibiotics are given to cattle to prevent liver abscesses, a side effect of the unnatural diet fed to them by *Homo sapiens*. In the March 2015 National Geographic Magazine, Kelsey Nowakowski reported that,

“Americans today eat three times as much poultry as they did in 1960. Since most U.S. chickens are raised in large, crowded facilities, farmers feed them antibiotics to prevent disease as well as speed their growth... **80% of all antibiotics sold in the United States are given to poultry and other livestock**... In 1960 it took 63 days to grow a chicken 3.4 lbs. chicken, in 2011 it took 47 days to grow a 5.4 lbs. chicken... Only 7 percent of some 400 antibiotic drugs given to livestock have been reviewed by the FDA”

To abuse antibiotics in this irresponsible manner for profits and increased demand has allowed for the potential of a pandemic, as antibiotics are now becoming useless in some medical applications. The December 2015 Naked Scientist podcast released a story '*Antibiotic Apocalypse*', in it, they reported that no truly new antibiotics have been developed in the last 20 years, yet the rate of resistance to antibiotics is increasing. Scientists have attributed this resistance mainly to the overuse of antibiotics to treat the overwhelming endemic diseases which farm faunas proliferate as a result of stress caused by the conditions which the faunas are exposed to.

In March 2016, CDC Director Tom Frieden, M.D., M.P.H. said, “New data show that far too many patients are getting infected with dangerous, drug-resistant bacteria in healthcare settings.” The antibiotic-resistant superbugs are: Carbapenem-resistant Enterobacteriaceae (CRE), Methicillin-resistant *Staphylococcus aureus* (MRSA), ESBL-producing Enterobacteriaceae (extended-spectrum β -lactamases), Vancomycin-resistant Enterococcus (VRE), Multidrug-resistant *Pseudomonas aeruginosa*, Multidrug-resistant *Acinetobacter*, and *Clostridium difficile*. *Clostridium difficile* was the most common type of bacteria responsible for infections in hospitals and which caused almost 500,000 infections in the United States in 2011. (66) The October 22, 2013 PBS Frontline report '*Hunting the Nightmare Bacteria*' explains the issue in detail. Antibiotics are often misused, as they are now sold over the counter in some countries and available globally through the Internet without a prescription, leading to regular use by some as a cure all solution, but this has only led to antibiotic resistant bacteria.

Perhaps nature has a solution to the antibiotic dilemma with an alternative antibiotic source from a flora species in one of the ever-shrinking rainforest. Scientists at Rockefeller University have discovered microorganisms found in soil that can be used to create antibiotics which kill pathogens resistant to multiple drugs currently in use. (706) Or perhaps in the not too distant past the solution was within the stomachs of *Homo sapiens* ancestors. A new study by scientists of Yanomani tribespeople has revealed some very interesting facts about the original human digestive bacteria and antibiotics. In April 2015, Michael Purdy reported that,

"The study, published April 17 in Science Advances, reports that the microbial populations on the skin and in the mouths and intestines of the Yanomami tribespeople were much more diverse than those found in people from the United States and Europe. The multicenter research was conducted by scientists at New York University School of Medicine, Washington University School of Medicine in St. Louis, the Venezuelan Institute of Scientific Research and other institutions.

In recent years, the abundance of antibiotics in medicine and agriculture has accelerated this process, stimulating the development and spread of genes that help bacteria survive exposure to antibiotics. Consequently, strains of human disease that are much harder to treat have emerged. “We have already run out of drugs to treat some types of multidrug-resistant infections, many of which can be lethal, raising the bleak prospect of a post-antibiotic era,” Dantas said.

“Our results bolster a growing body of data suggesting a link between, on one hand, decreased bacterial diversity, industrialized diets and modern antibiotics, and on the other, immunological and metabolic diseases — such as obesity, asthma, allergies and diabetes, which have dramatically increased since the 1970s,” said Maria Dominguez-Bello, PhD, associate professor of medicine at New York University Langone Medical Center and senior author of the study. “We believe there is something occurring in the environment during the past 30 years that has been driving these diseases, and we think the microbiome could be involved.”

Dominguez-Bello said the research suggests a link between modern antibiotics, diets in industrialized parts of the world and a greatly reduced diversity in the human microbiome — the trillions of bacteria that live in and on the body and that are increasingly being recognized as vital to good health. Yanomami as for how bacteria could resist drugs that such microbes

never before had encountered, the researchers point to the possibility of cross-resistance, when genes that resist natural antibiotics also have the ability to resist related synthetic antibiotics.

“We’ve seen resistance emerge in the clinic to every new class of antibiotics, and this appears to be because resistance mechanisms are a natural feature of most bacteria and are just waiting to be activated or acquired with exposure to antibiotics,” Dantas said.” (36)

Cattle are also given steroids like estradiol and trenbolone acetate to add muscle and make the product larger to increase profits. To inject faunae with these unnatural steroids is some of the worst modifications that can be done to a food source, especially when flora-based foods never need these antibiotics or steroids to produce a perfectly natural and healthy food product. Shouldn’t food companies be required to reveal the sources of the food they are selling, any modifications done with genetics, fertilizers, pesticides, medications, or other technologies?

For decades now in the United States some cows have been fed aesthetically defective candy like Skittles as an inexpensive carbohydrate source. (240) Would consumers still eat this meat if they knew exactly what the fauna was eating? Why is this meat not labeled candy-fed like other meat which is labeled grass-fed or grain-fed?

Fresh Fruits and Vegetables / Flora Based Food Sources

Compare the actions, energy level, mood, lifespan, outer appearance, bowel movements, and overall health of an individual who eats an organic vegan diet of whole grains, beans, fruits, nuts, seeds, and vegetables with someone who eats fast food, junk food, meat, dairy, and other disgusting unhealthy foods, and one will see vast differences with far more positive results from the vegan individual. It is also a fact that vegans have a smaller carbon footprint as a result of not consuming meat. And in spite of the erroneous belief that meat must be consumed in order to maintain health, all the nutritional needs of *Homo sapiens* can be fulfilled entirely on a vegan diet, in fact even more so than on a fauna-based diet. Eating a vegan diet of whole grains, beans, fruits, nuts, seeds, and vegetables has been proven to be far healthier. Many vegan converts cannot believe how they ate meat for so long in such vast quantities. Some are even disgusted by the taste of dairy, eggs, and meat when attempting to revert back to an omnivore diet, and ultimately switch back to the healthier better tasting vegan diet.

Some have a misconception about vegans being skinny and malnourished, but vegans are actually far healthier and maintain a perfect body weight compared to their obese omnivore counterparts. Many athletes eat a vegan diet, and Roman gladiators ate mostly a vegan diet of barley and vegetables, they were even sometimes referred to as *hordearii* which literally means 'barley men'. (291) Claims have also been made that meat must be consumed to maintain a healthy and balanced diet, that without meat an individual cannot get the required vitamins and other nutritional components to maintain health. But if one compares the vitamin and mineral sources, it is obvious that all of the vitamins and other nutritional components needed to maintain health are found in flora-based sources. In fact, many nutritional qualities like carbohydrates, fiber, vitamin C, vitamin K, and antioxidants are only found in sufficient quantities when from flora-based sources and are found in minute quantities from a fauna source as a result of the fauna consuming flora. The following table illustrates how flora-based food sources contain far more nutrition, and that there is also allot more variety to choose from than fauna-based food sources.

Source Comparison of Vitamins and Other Nutrition Components		
Component	Some of the Best Flora or Other Natural Sources	Some of the Best Fauna or Other Modified Sources
Protein	cereals, most all fruits and vegetables, legumes, nuts, and whole grains	beef, dairy products, eggs, fish, and poultry
Fats	nuts, polyunsaturated and monounsaturated fats from vegetable-based oils	beef, dairy products, eggs, fish, and poultry
Carbohydrates	most all fruits and vegetables, grains, and legumes	NONE
Fiber	apple skins, avocados, barley, berries, broccoli, carrots,	NONE

	cauliflower, celery, figs, green beans, legumes, legumes, nuts and seeds, oats, onions, pears, plums, potato skins, prunes, ripe bananas, rye, sweet potatoes, wheat and corn bran, whole grain foods, zucchini	
Vitamin A	apricots, broccoli, cantaloupe, carrots, collard greens, kale, mango, papaya, peas, pumpkin, spinach, and tomatoes	chicken, beef, pork, and fish livers, dairy products, and eggs
Vitamin B1 (Thiamine)	corn flour, legumes, rice, seeds, and spinach	enriched breads and flour and pork
Vitamin B2	almonds, most all leaf vegetables, and mushrooms	dairy products, eggs, kidneys, and livers
Vitamin B6	bananas, chickpeas, pistachios, potatoes, and whole grains	beef, pork, and turkey
Vitamin B12	vegetables grown in healthy organic soils (see notation below)	beef, dairy products, eggs, poultry, shellfish, and turkey
Niacin	apricots, bell peppers, ginger, portabella mushrooms, potatoes, sesame seeds, sunflower seeds, tarragon, and whole grains	pork, tuna, and turkey, and veal
Vitamin B9 (Folic Acid / Folate)	asparagus, avocados, Brussels sprouts, legumes, dark green leafy vegetables, most all fruits, nuts, peas, spinach, and whole grains	beef, eggs, enriched breads, and poultry, and seafood
Vitamin C	most all fruits and vegetables	NONE
Vitamin D	sunlight	fortified dairy products
Vitamin E	avocados, broccoli, canola oil, kiwifruit, mangos, nuts, olive oil, pumpkins, sesame oil, sunflower oil, and tomatoes	dairy products
Vitamin K	asparagus, broccoli, Brussels sprouts, cabbage, collard greens, kale, lettuce, mustard greens, parsley, spinach, and turnip greens	NONE
SOURCE: Wikipedia (with some corrections, additions, and other edits)		

NOTE ON B12: Dr. T. Colin Campbell, Ph.D. states that,

“Research has convincingly shown that plants grown in healthy soil that has a good concentration of vitamin B12 will readily absorb the nutrient. However, plants grown in “lifeless” soil (non-organic soil) may be deficient in vitamin B12. In the United States, most of our agriculture takes place on relatively lifeless soil, decimated from years of unnatural pesticide, herbicide and fertilizer use. So the plants grown in this soil and sold in our super markets lack B12. In addition, we live in such a sanitized world that we rarely come into direct contact with the soil borne microorganisms that produce B12. At one point in our history, we got B12 from vegetables that hadn't been scoured of all the soil.” (101)

Furthermore, if one examines the nutrient composition chart below, they will see that flora-based foods have far more nutrition than fauna-based foods. It is unfortunate that so few know this information, or even take the time to actually inquire about the foods they are consuming, but instead simply consume whatever the food conglomerates supply and market to them.

Nutrient Composition of Plant and Animal-Based Foods (Per 500 Calories of Energy)		
Nutrient	Plant-Based Foods (1)	Animal-Based Foods (2)
Cholesterol(mg)	0	137
Fat(g)	4	36
Protein(g)	33	34
Beta-carotene(mcg)	29,919	17

Dietary Fiber(g)	31	0
Vitamin C(mg)	293	4
Folate(mcg)	1,168	19
Vitamin E (mg_ATE)	11	0.5
Iron(mg)	20	2
Magnesium(mg)	548	51
Calcium(mg)	545	252
(1) Equal parts of tomatoes, spinach, lima beans, peas, potatoes (2) Equal parts of beef, pork, chicken, whole milk SOURCE: The China Study (2006) by: Dr. T. Colin Campbell, Ph.D. And Thomas M. Campbell II ISBN: 1-932100-66-0 p.230		

Some omnivores consume little to no fiber and are so constipated they take must take medication in order to defecate, while others resort to bringing reading material into the bathroom because it takes them so long to defecate on the rare occasion that they actually do. Some *Homo sapiens* consume vast quantities of vitamins and nutritional supplements in an attempt to maintain health, most do not monitor and regulate their intake and end up taxing their organs as a result when excreting these excess vitamins and minerals in their urine and feces. This unnecessary stress on the liver, kidneys, and digestive system can also lead to digestive problems and even early organ failure. The billion-dollar vitamin and nutritional supplement industry is strongly based on the erroneous assumption that *Homo sapiens* can't get sufficient vitamins and minerals from food sources, or that they can simply replace food with a pill. Would it not be more logical to consume healthy and nutritional flora-based foods versus attempting to get vitamins, minerals, and fiber from a pill source? The PBS Frontline report '*Supplements and Safety*' January 19, 2016 reports on this controversial billion-dollar industry. Would vitamins and other nutritional supplements even be necessary if *Homo sapiens* simply consumed a healthier vegan-based diet instead of a meat- and dairy-based diet?

The May 2014 National Geographic Magazine, reported that Farmers markets which sell mainly fruits and vegetables had increased from 4,685 markets in 2008, to 8,144 markets in 2014. This increase is great news for consumers that prefer local, often organic, fresh fruits and vegetables. It also shows that food can be supplied directly from farmer to customer and eliminate all the greedy brokers, manufacturers, wholesalers, and retailers which serve as middlemen and only make the food far costlier than it should be. If the local organic farmers can continue growing in numbers, then this positive trend could have an enormous impact on food sources and the food quality. The consumer demand for more natural, organic, and less genetically modified foods is growing, especially as consumers have more natural alternatives for flora-based food sources from around the world. Consumers now have more choices than ever when it comes to food sources which are vegan, organic, and additive free. There are even emerging vegan specialty companies like Beyond Meat, Gardein, Tofurky, Yves Veggie Cuisine, Field Roast, LightLife, Sweet Earth Foods, The Jackfruit Company, along with several others and now there is even VEGANZ, a chain of vegan grocery stores. There are also new companies like Ugly Juice which not only make a vegan product, but also help to fight food waste by making fresh juice from produce which would otherwise be discarded for aesthetic reasons.

Healthy fresh fruits and vegetables can be produced inexpensively on an individual or commercial level, and naturally without using synthetic pesticides, additives, hormones, antibiotics, or genetic modifications. If a majority of *Homo sapiens* switch to a vegan-based diet consuming no meat or dairy products which are sourced from other mammals, aves, or fish, this could tremendously help in reducing pollution, water consumption, and increase the overall well-being of *Homo sapiens*. If all the food available were nutritional and healthy, would this not alleviate many health issues?

Current Medical Epidemics

Regarding the connection that nutrition and disease have, Hippocrates wrote,

"Whoever pays no attention to these things, or, paying attention, does not comprehend them, how can he understand the diseases which befall a man?" (311)

Nearly 2,500 years ago Hippocrates referred to this link between nutrition and disease, and 150 years ago surgeon and author George Macilwain identified alcohol, grease, and fat as being the main causes of cancer. (105) Thus for a very long-time, *Homo sapiens* have been aware of how dietary factors can cause disease. So why then is modern medicine wasting so much time and so many resources attempting to cure easily preventable diseases? Why are more individuals not educated from youth about nutrition and how to live a more healthy and longer life while also making less impact upon Earth?

Many individuals know Greek history, it is taught in many schools at many grade levels, but there is a mainstream focus on the antiquated subjects of mythology, war, and the tyrants who waged these wars, while the subjects of science and health often go virtually unnoticed, and this is unfortunate as there is much to be learned. Dr. T. Colin Campbell, Ph.D. tells of one such ancient lesson that perhaps applies even more so today than when it was written,

"Almost 2,500 years ago, Plato wrote a dialogue between two characters, Socrates and Glaucon, in which they discuss the future of their cities. Socrates says the cities should be simple, and the citizens should subsist on barley and wheat, with "relishes" of salt, olives, cheese and "country fare of boiled onions and cabbage," with deserts of "figs, peas, beans," roasted myrtle-berries and beechnuts, and wine in moderation. Socrates says, "And thus, passing their days in tranquility and sound health, they will in all probability, live to an advanced age...."

But Glaucon replies that such a diet would only be appropriate for "a community of swine," and that the citizens should live "in a civilized manner." He continues, "They ought to recline on couches...and have the usual dishes and dessert of a modern dinner." In other words, the citizens should have the "luxury" of eating meat. Socrates replies, "if you wish us also to contemplate a city that is suffering from inflammation....We shall also need great quantities of all kinds of cattle for those who may wish to eat them, shall we not?"

Glaucon says, "Of course we shall." Socrates then says, "Then shall we not experience the need of medical men also to a much greater extent under this than under the former régime?" Glaucon can't deny it. "Yes, indeed," he says. Socrates goes on to say that this luxurious city will be short of land because of the extra acreage required to raise animals for food. This shortage will lead to citizens to take land from others, which could precipitate violence and war, thus a need for justice. Furthermore, Socrates writes, "when dissoluteness and disease abound in a city, are not law courts and surgeries opened in abundance, and do not Law and Physic begin to hold their heads high, when number even of well-born persons devote themselves with eagerness to these professions?" In other words, in this luxurious city of sickness and disease, lawyers and doctors will become the norm.

Plato, in this passage, made it perfectly clear: we shall eat animals only at our own peril. Though it is indeed remarkable that one of the greatest intellectuals in the history of the Western world condemned meat eating almost 2,500 years ago, I find it even more remarkable that few know about this history. Hardly anybody knows, for example, that the father of Western medicine, Hippocrates, advocated diet as the chief way to prevent and treat disease or that George Macilwain knew that diet was the way to prevent and treat disease or that the man instrumental in founding the American Cancer Society, Frederick L. Hoffman, knew that diet was the way to prevent and treat disease.

How did Plato predict the future so accurately? He knew that consuming animal foods would not lead to true health and prosperity. Instead, the false sense of rich luxury granted by being able to eat animals would only lead to a culture of sickness, disease, land disputes, lawyers and doctors. This is a pretty good description of some of the challenges faced by modern America!" (114)

The mainstream western society diet is high in fat, sugar, cholesterol, and sodium which has resulted in epidemics of obesity, diabetes, high blood pressure, cardiovascular disease, strokes, autoimmune diseases, various cancers, and other chronic diseases of affluence. These resulting medical conditions have also cost trillions of dollars and placed unneeded stress on the medical resources of the world. These conditions have helped to create a massive trillion-dollar network of businesses offering life-threatening surgery, pseudo specialists, pseudo treatments, potentially lethal prescription drugs, gimmicks, and other pseudo solutions that are unable to solve an ever growing worldwide self-inflicted health epidemic. In other countries where plant-based diets are more predominant, these diseases are virtually non-existent until the fauna-based western diet is introduced, and the population begins consuming vast quantities of meat and dairy. Gluttonous consumption of foods high in fat, sugar, cholesterol, and sodium combined with alcohol, tobacco, stress, and a sedentary lifestyle

have made cardiovascular disease the leading cause of death worldwide. And the number of annual victims is quickly rising, from 12,300,000 *Homo sapiens* worldwide dying of cardiovascular related causes in 1993, to 17,300,000 in 2013. (37) There has also been an increase in the incidence rate of anaphylaxis. Dr. F. Estelle R. Simons states,

“...it is clear that anaphylaxis is not rare and that the rate of occurrence is increasing, especially in the first 2 decades of life. In a retrospective, population-based study using the resources of the Rochester Epidemiology Project, the incidence rate of anaphylaxis was reported to double from 21 per 100,000 person-years in the 1980s to 49.8 per 100,000 person-years in the 1990s.” (126)

In addition, a 2015 study on clinical and diagnostic aspects of gluten related disorders stated,

“Gluten is one of the most abundant and widely distributed components of food in many areas. It can be included in wheat, barley, rye, and grains such as oats, barley, spelt, kamut, and triticale. Gluten-containing grains are widely consumed; in particular, wheat is one of the world’s primary sources of food, providing up to 50% of the caloric intake in both industrialized and developing countries. Until two decades ago, celiac disease (CD) and other gluten-related disorders were believed to be exceedingly rare outside of Europe and were relatively ignored by health professionals and the global media. In recent years, however, the discovery of important diagnostic and pathogenic milestones led CD from obscurity to global prominence. In addition, interestingly, people feeding themselves with gluten-free products greatly outnumber patients affected by CD, fuelling a global consumption of gluten-free foods with approximately \$2.5 billion in United States sales each year. The acknowledgment of other medical conditions related to gluten that has arisen as health problems, providing a wide spectrum of gluten-related disorders.” (92)

This deadly diet, along with other lifestyle choices, combined with the polluted and toxic environment of Earth, is also impacting *Homo sapiens* reproduction abilities. Diabetes, obesity, heart disease, and high blood pressure all helped to increase the maternal mortality rates 27% in 48 U.S. states and Washington, D.C. between 2000 to 2014. (437) The 52.4% sperm count decline between 1973 and 2011 in men from North America, Europe, Australia, and New Zealand has been plausibly associated with environmental influences and lifestyle factors like: pesticides, diet, smoking, and stress. (442) In the United States, 4,500,000 women had impaired fecundity or difficulties conceiving or bringing a pregnancy to term in 1982, by 2002 this number increased to 7,300,000 women. And while this dramatic increase in infertility and impaired fecundity are not well understood, sexually transmitted infections, environmental toxins, and certain lifestyle factors have been the focus of ongoing research. (694)

Many of these chronic diseases of affluence are so easily preventable as they are caused primarily by vitamin deficiencies. (121) Scientific research and the evidence it has gathered shows that countries with a diet of mostly unrefined flora-based foods have far lower rates of these chronic diseases. Most consumers are very ignorant about health knowledge and more especially about nutrition, thus they naively allow commercial food companies to take this responsibility. Unfortunately for consumers health, most commercial food companies are in the business to make profits, and this has resulted in making the cheapest food products using the unhealthiest ingredients. Many think the solution to solving chronic diseases of affluence is through genetic modification, but genetics determines only 2 to 3% of these diseases while environmental factors, lifestyle, and diet are major influences. This misunderstanding lead many to believe that these chronic diseases of affluence will someday be cured by simply turning the gene off. Another misconception is that eating grass fed, farm raised meat and dairy is somehow safer and healthier, but it's not so much the process as it is the product being consumed, which is unhealthy. And yet this erroneous notion is still perpetuated by some companies as being a safer better alternative, while also allowing these companies to charge exorbitant prices for something that will have the same negative health consequences. And although the Hippocratic oath states, “I will prevent disease whenever I can, for prevention is preferable to cure,” many doctors practice the exact opposite of this philosophy. By utilizing education and making healthy alternatives readily available, chronic diseases of affluence can be prevented in many if not most instances. So why then isn't it being done? Dr. T. Colin Campbell, Ph.D. states that,

“When nutrition education is provided in relation to public health problems, guess who is supplying the “educational” material? The Dannon Institute, Egg Nutrition Board, National Cattlemen's Beef Association, National Dairy Council, Nestlé Clinical Nutrition, Wyeth-Ayerst Laboratories, Bristol-Myers Squibb Company, Baxter Healthcare Corporation and others have all joined forces to product a Nutrition in Medicine program and the Medical Nutrition Curriculum Initiative. Do you

think that this all-star team of animal foods and drug industries representatives is going to objectively judge and promote optimal nutrition, which science has shown to be a whole foods, plant-based diet that minimizes the need for drugs? Or might they try to protect the meat-centered, Western diet where everyone expects to pop a pill for every sickness?"

"Our institutions and information providers are failing us. Even cancer organizations, at both the national and local level, are reluctant to discuss or even believe this evidence. Food as a key to health represents a powerful challenge to conventional medicine, which is fundamentally built on drugs and surgery. The widespread communities of nutrition professionals, researchers and doctors are, as a whole, either unaware of this evidence or reluctant to share it. Because of the failings, Americans are being cheated out of information that could save their lives." (118)

During his extensive career Dr. T. Colin Campbell, Ph.D. has been at the forefront of nutrition research, he has conducted studies which focus on cancer and the effects that fauna-based protein versus flora-based protein have on promoting and even decreasing cancer. The China Study, which is to date, the most comprehensive study of health and nutrition ever conducted, revealed some very interesting data. In the China Study and several other nutritional studies all the results point to the same conclusion, meat and dairy based food sources are unhealthy and even deadly, while flora-based food sources are healthy and promote life. Dr. T. Colin Campbell, Ph.D. states that,

"More commonly known as the China Study, this project eventually produced more than 8,000 statistically significant associations between various dietary factors and disease!"

What made this project especially remarkable is that, among the many associations that are relevant to diet and disease, so many pointed to the same finding: people who ate the most animal-based foods got the most chronic disease. Even relatively small intakes of animal-based food were associated with adverse effects. People who ate the most plant-based foods were the healthiest and tended to avoid chronic disease."

"In fact, dietary protein proved to be so powerful in its effect that we could turn on and turn off cancer growth simply by changing the level consumed...What protein consistently and strongly promoted cancer? Casein, which makes up 87% of cow's milk protein, promoted all stages of the cancer process. What type of protein did not promote cancer, even at high levels of intake? The safe proteins were from plants, including wheat and soy."

"...nutrients from animal-based foods increased tumor development while nutrients from plant-based foods decreased tumor development."

"Almost all of us in the United States will die of diseases of affluence. In our China Study, we saw that nutrition has a very strong effect on these diseases. Plant-based foods are linked to lower blood cholesterol; animal-based foods are linked to higher blood cholesterol. Animal-based foods are linked to higher breast cancer rates; plant-based foods are linked to lower rates. Fiber and antioxidants from plants are linked to a lower risk of cancers of the digestive tract. Plant-based diets and active lifestyles result in a healthy weight, yet permit people to become big and strong...we can minimize our risk of contracting deadly diseases just by eating the right food." (117)

Furthermore, Dr. T. Colin Campbell, Ph.D. speculates that cancer could be dormant just waiting to be activated by the consumption of meat and dairy foods, in writing,

"In simple terms, the body holds a grudge. It suggests that if we are exposed in the past to a carcinogen that initiates a bit of cancer that remain dormant, this cancer can still be "reawakened" by bad nutrition."

"Is it possible that chemical carcinogens, in general, do not cause cancer unless the nutritional conditions are "right"? Is it possible that, for much of our lives, we are being exposed to small amounts of cancer causing chemicals, but cancer does not occur unless we consume foods that promote and nurture tumor development? Can we control cancer through nutrition?"

"...in both rodents and humans the initiation stage is far less important than the promotion stage of cancer. This is because we are very likely "dosed" with a certain amount of carcinogens in our everyday lives, but whether they lead to full tumors depends on their promotion or lack thereof."

"...our most powerful weapon against cancer is the food we eat every day." (122)

Obesity has nearly tripled worldwide since 1975. In 2016, there were more than 1,900,000,000 adults aged 18 years and older which were overweight, with 650,000,000 of them being obese. In addition, there were 41,000,000 children under the age of 5 that were either overweight or obese, and more than 340,000,000 children and adolescents aged 5 to 19 that were also overweight or obese. (608) Of the 195 countries in the world, 96

countries have high obesity rates with 20% or more of the population being obese. It should also be noted, that in addition to the obese percentage, another 20% or more of the population of many countries is overweight.

SOME COUNTRIES WITH HIGH OBESITY RATES	
% OF POPULATION OBESE	COUNTRY
42	KUWAIT
33	BELIZE
33	EGYPT
33	UNITED STATES
33	SAUDI ARABIA
32	CZECH REPUBLIC
32	UNITED ARAB EMIRATES
32	MEXICO
31	SOUTH AFRICA
30	FIJI
30	VENEZUELA
29	ARGENTINA
29	CHILE
28	NEW ZEALAND
27	LIBYA
27	TURKEY
27	HUNGARY
27	LITHUANIA
27	LEBENON
27	SYRIA
27	IRAQ
26	UNITED KINGDOM
26	AUSTRALIA
26	SPAIN
26	RUSSIA
26	CANADA
26	ISRAEL
26	LUXEMBOURG
25	EL SALVADOR
25	CYPRUS
25	PANAMA
25	POLAND
25	IRELAND
25	GERMANY
SOURCE: CIA WORLD FACT BOOK 2017	

When 1/4 to 1/3 of a population is obese, one might be led to believe that there is a serious problem with the society's food sources and lifestyle choices. The CDC states that American adult men and women are 25 pounds heavier on average than they were in 1960. (161) In 2008, the estimated yearly medical costs of obesity in the United States was as high as \$147,000,000,000 a year, or nearly 10% of all medical spending. An amount which nearly doubled since 1998 from an estimated of \$78,500,000,000 a year. (162) Obesity is now more than ever an

accepted part of western society, and it is considered just another lifestyle. The entertainment industry portrays obese *Homo sapiens* as happy and funny, as just another character. There are even specialty clothing stores which cater specifically towards obese *Homo sapiens*, with the socially acceptable name called '*Plus Size*'. An entire billion-dollar pseudo diet and weight loss industry has developed around obesity. Obesity has in fact become just another negative thing that society accepts, while ignoring the simple solution that most obesity issues could easily be corrected with daily exercise and consuming a healthy diet. Some are also delusional in thinking that as you get older your metabolism slows down and you just simply get fatter with age.

Obesity is so prevalent in western societies that it has also affected dogs and cats which have developed this condition. As a result of *Homo sapiens* feeding them a diet high in fat combined with a sedentary lifestyle, an estimated 35% of cats and 34% of dogs in the United States are overweight or obese. (404) Engaging in glutton competitions while other *Homo sapiens* are starving around the world is a major warning sign that society has serious issues with regard to food consumption and distribution. If every individual in developed countries went hungry for a month eating a daily diet which consisted of only one small bowl of rice and beans per day, would their attitude not change towards helping to eliminate world hunger and food waste? One thing is certain it would definitely help those who are morbidly obese to lose some weight. Will the world ever reverse the current obesity epidemic, or will future generations continue down the same path their ancestors took? Perhaps the most recent spikes in consumer food cost combined with recent product quantity decreases will lead to slightly less consumption and more awareness about the quantities of food they are consuming versus the recommended amount.

Part of the cause is from consumers not having had nutritional education and disciplinary eating habits, while the other part is a result of commercial companies themselves offering and promoting unhealthy foods. There are nutritional and ingredient labels which detail everything about the food item, but how many consumers actually read or even understand this data? And what good are the labels if the members of the Food and Nutrition Board (FNB) who decide the Recommended Daily Allowance (RDA) are heavily influenced by the meat, dairy, sugar, and other food industries? Why must *Homo sapiens* waste resources attempting to fight and control these medical issues with science and medicine, when they could easily be prevented by not consuming meat, dairy, and other unhealthy foods? How many billions of dollars each year goes towards the medical expenses of these easily preventable diseases? Could medical treatments be decreased by 70% or more if *Homo sapiens* simply changed their lifestyle and diet? Is it simply a matter of the consumer's eating habits changing by choice, either through education or as a result of health issues from an indulgent and unhealthy diet in the past?

Temporary Solutions for Permanent Problems

The lengths some *Homo sapiens* will go to for medical treatment are sometimes unthinkable. (e.g. dental amalgam is still practiced for treating cavities even though it utilizes highly toxic mercury) Why would anyone put such a highly toxic substance permanently into their mouth potentially endangering their health, and ultimately releasing mercury pollution into the atmosphere or soil when they die? Why are toxic treatments like chemotherapy used when they have so many adverse side effects and such a low success rate? Why are medical procedures like electroconvulsive therapy still used when there are questions as to the efficacy, ethics, and adverse side effects of the treatment? Why are synthetically created medicines used so heavily when they have so many possible adverse side effects and warnings?

There were 66,000 kidney transplants in 2005 which only covered around 10% of requested donations. Organ transplants have extended some lives with many organs transplanted which are taken from willing donors who want to help others when they die. But unfortunately, like most medicine, organ transplants have become just another medical industry based around profits that cannot meet the demand resulting in a black market of desperate poor donors. In some villages in Pakistan 40 to 50% of the village residents have only one kidney because they have sold the other. (367) In China, an estimated 60,000 to 100,000 organs are transplanted each year with the majority of donor organs coming from executed prisoners of conscience. Between 2000 and 2016, an estimated 1,500,000 organ transplants took place in China. (368) Do these organ recipients know, or even care where these organs are being sourced from? If an individual has taxed their organs to the point of failure because

of their negative lifestyle choices and now needs an organ transplant, would not the simpler more cost-effective solution have been prevention? Would there even be such a demand for organs if *Homo sapiens* maintained healthier lifestyles? Are *Homo sapiens* so desperate to live they will attempt insane pseudo medical treatments and go so far as to transplant organs? Have these individuals not reached a point of acceptance that death is inevitable and that nothing can make you live forever? *Homo sapiens* seem so desperate to live as long as possible that they will pay any amount and attempt anything, risking even the certain possibility of death which they are attempting to defy. If some have their way, organ transplants in the future will be grown inside pigs, one of the very fauna species which is being eaten and causing so many to need an organ transplant in the first place. (430) What does it say about a society's morals toward another sentient being, which is exploited first by eating it and then by using it to harvest replacement organs? Perhaps future medicine will be more like Miguel Sapochnik's 2010 '*Repo Men*', where organ transplants will be just another overpriced commodity which is sold and repossessed when consumers can no longer afford it. Shouldn't *Homo sapiens* attempt to solve the anthropogenic issues which claim far more lives before attempting to change and alter the natural ones?

There are many natural medicines which are derived from florae, some of which have been used for thousands of years. But much knowledge about natural medicine which was known by *Homo sapiens* ancient ancestors is unknown today and is simply waiting to be rediscovered. This ancient and once common knowledge has either been replaced by synthetic drugs or simply forgotten. Many florae of Earth have not been identified, classified, or described, and these unknown florae and much of the known florae have never even been scientifically researched for medicinal applications. Perhaps if a more natural cure to diseases is sought through ethnobotany, so many ailments which plague *Homo sapiens* could be a thing of the past. Nature is perfect and has a solution to every problem that is encountered, for it is not seen as a problem to nature, but simply a piece of nature's larger puzzle. The hurdle which *Homo sapiens* are faced with is not one of finding the solution to nature's problems, but the correct natural solution which nature already knows. If *Homo sapiens* continue to seek the answers to problems in a synthetic way attempting to playing God with science, they may continue to only find temporary solutions to permanent self-inflicted problems. Do potential new medicinal drugs await *Homo sapiens* from undiscovered flora in one of the many unexplored ecosystems of the Earth? Could florae revolutionize medicine and lead *Homo sapiens* to abandon potentially harmful synthetic drugs which result in the deaths of so many every year? How much different would the medical system be if more resources were devoted to researching ethnobotany, herbalism, nutrition, ethnomedicine, and other natural alternative therapies?

The human body is resilient and can heal itself if given time and the proper nutrition, but much of modern medicine is based on extreme treatments, some even experimental, which actually weaken the immune system and can result in additional medical issues and even death. *Homo sapiens* are a beautifully created complex organism, to attempt manipulation of it through technology or to rely on pseudo-science for shortcuts as an alternative for better health is nothing more than ignorance and foolishness. No pill can replace whole foods, no surgery can permanently fix the body or make one live a healthier life, no genetic modifications will alleviate diseases of affluence, and no fauna-based diet will ever be as healthy as a flora-based one. The only true way to maintain a healthy body, is through a healthy flora-based diet and an active lifestyle. Age is a part of life, and acceptance of aging is something many do not want to do so they instead attempt to hide or stop the inevitable with plastic surgery, pseudo medicines, and other anti-aging schemes. Some *Homo sapiens* take 5, 10, 15, or more pills per day, how stressed are the livers, kidneys, and other organs of these individuals? Is attempting to prolong an inevitable death really worth the excessive strain placed on the medical community and environment? Is fighting an inevitable death in this manner really considered living?

A Healthcare System Based Around Money and Profits

Medicine has become an industry based on profits, not a system based solely on helping the sick. In 2013, the world spent \$7,350,000,000,000 on healthcare, more than double spent in 2000, with a total world market for medicines and medical technologies estimated to be \$11,000,000,000,000. (413) The United States spends more than 17% of its GDP on healthcare. In 2010, the costs of cancer care in the United States alone was \$124,570,000,000. (270) In 2013, the top 10 bestselling cancer drugs had a combined revenue of \$37,470,000,000. (271) Has cancer become just another sector of the medical industry with a profitable pseudo

cure, while natural treatments and possibly even a cure utilizing cannabis has been proven scientifically in laboratory tests, but is ignored by most of the medical establishment? CNBC reported in 2017, that the top six health insurers in the United States reported \$6,000,000,000 in adjusted profits for the second quarter, which was a 29% increase from the same quarter a year ago. (577) Millions of *Homo sapiens* every year become even poorer as a result of their medical expenses. A 2015 WHO report concluded,

"Every year, some 100 million people fall below the poverty line as a result of out-of-pocket expenditures on health, and a further 1.2 billion, already living in poverty, are pushed further into penury for the same reason." (413)

Basing medical care mainly around money and profits has ultimately led to exorbitant prices for medical treatment, and more especially for synthetic prescription drugs, resulting in many around the world having limited access to medicine because they simply cannot afford it. How can life itself be based on a monetary value? How many patients are treated each year unnecessarily to make a profit? How many millions of dollars and resources were wasted on patients who would have inevitably died anyway? Why must millions of *Homo sapiens* become poor in order to get medical treatment to sustain life? Shouldn't medical care be based on helping patients and not on making profits? What good is a cure if it is based mainly on money and thus unavailable to much of the world's population? When the government mandates all Americans have health insurance or pay a tax penalty, is this not further evidence the health system is based around money and profits and not on actual healthcare? Why is the Catholic religion allowed to own hospitals and other healthcare facilities allowing medical directives to be influenced with their religious beliefs, while also receiving federal funding? Will there ever be free Universal Health Care for the entire world?

In the United States, care for the elderly, disabled, and dying has become just another business where private companies charge vast sums of money and often provide inadequate care. In 2014, the CDC reported that in the United States, there were 12,400 home health agencies serving 4,900,000 patients with 80% of home health agencies being for-profit ownership, 30,200 residential care communities with 835,200 residents with 81.8% of residential care communities being for-profit ownership, 4,000 hospice care agencies with 1,300,000 patients with 60.2% of hospice care agencies being for-profit ownership, and 15,600 nursing homes housing 1,400,000 residents with 69.8% of nursing homes being for-profit ownership. (581) Between 2012 and 2014, there were 8,100 fires in nursing homes, 66% of which were started by cooking vessels. (580) How can so many fires occur in facilities which are supposed to be providing things like hot food and beverages within a safe and secure environment? How can families with adequate resources abandon their relatives in such facilities?

Prescription Drug Epidemic

The vast majority of medical issues today are caused by negative lifestyle choices and environmental factors, and yet to cure today's medical issues, be it mental illness, stress, depression, or dietary health issues, society has resorted to experimental science in an attempt to '*Cure all with a pill*'. Many of these preventative ills could easily be cured by simple lifestyle and dietary changes, education, social changes, or perhaps even alternative natural medicines derived from flora. Other medical issues like asthma could be drastically reduced if environmental conditions in cities improved and the air quality were less polluted. Everything is susceptible to the biological laws of cause and effect, especially dietary habits, if you eat unhealthily or live in an unhealthy environment you will become unhealthy, and no amount of pills or extreme medical treatments will change the results, they may perhaps delay the inevitable, but only temporarily. In many instances, modern medicine and what doctors call a cure has done nothing more than prolong pain and suffering of many preventative diseases and other health ailments. In fact, most prescription drugs only work on 50% or less of the patients who take them, an open secret within the drug industry and one admitted to in 2003 by Allen Roses, the former worldwide vice-president of genetics at GlaxoSmithKline who stated,

"The vast majority of drugs - more than 90 per cent - only work in 30 or 50 per cent of the people, I wouldn't say that most drugs don't work. I would say that most drugs work in 30 to 50 per cent of people. Drugs out there on the market work, but they don't work in everybody." (197)

The pharmaceutical companies have, in essence, formed a monopoly over many drugs while also engaging in price gouging to increase profits. This monopoly has created a trillion-dollar industry of over overpriced, over-prescribed, and sometimes addictive pharmaceutical drugs. Utilizing patents, tax breaks, and government subsidies the pharmaceutical industry has created a monopoly that charges exorbitant prices on drugs that the public is either addicted to taking or unknowingly forced to take through ignorance and a medical community of doctors who condone the practice and perpetuate it on a daily basis. Dr. T. Colin Campbell, Ph.D. remarks that,

“Considered from another perspective, the NCI (of the NIH), in 1999 had a budget of \$2.93 billion. In a “major” 5-A-Day dietary program, it was spending \$500,000 to \$1 million to educate the public to consume five or more servings of fruits and vegetables per day. This is only *three hundredths of one percent* (0.0256%) of its budget. That's \$2.56 for every \$10,000! If it calls this a major campaign, I pity its minor campaigns.”

“If very few of our tax dollars are used to fund nutrition research, what do they fund? Almost all of the billions of dollars of taxpayer money expended by the NIH each year funds projects to develop drugs, supplements and mechanical devices. In essence, the vast bulk of biomedical research funded by you and me is basic research to discover products that the pharmaceutical industry can develop and market. In 2000, Dr. Marcia Angell, a former editor of the *New England Journal of Medicine*, summarized it well when she wrote:

...the pharmaceutical industry enjoys extraordinary government protections and subsidies. Much of the early basic research that may lead to drug development is funded by the National Institutes of Health. It is usually only later, when the research shows practical promise that the drug companies become involved. The industry enjoys great tax advantages. Not only are its research and development costs deductible, but so are its massive marketing expenses. The average tax tare of major U.S. Industries from 1993 to 1996 was 27.3% of revenues. During the same period the pharmaceutical industry was reportedly taxed at a rate of only 16.2%. Most important, the drug companies enjoy seventeen-year government-granted monopolies on their new drugs-that is, patent protection. Once a drug is patented, no one else may sell it, and the drug company is free to charge whatever the traffic will bear.” (119)

The pharmaceutical industry makes huge profits every year but spends far more on marketing medications than on actual research and development. (316) Globally, pharmaceutical industry revenue each year is now more than \$1,000,000,000,000. Every year in the United States physicians order or provide 2,915,400,000 drugs to their patients. 48.7% of the United States population uses one prescription drug, 21.8% use three or more prescription drugs, 10.7% use 5 or more prescription drugs. What does it mean when nearly half the population takes a prescription drug? Are Americans extremely sick or are they being overmedicated for monetary profits? (202)

Many pharmaceutical drugs cost very little to manufacture but retail for an exorbitant amount, the epinephrine autoinjector, aka EpiPen is a prime example of this costing around \$1 to manufacture and retailing for \$600. In the United States from 2002 to 2013, spending for insulin per patient increased from \$231.48 to \$736.09 which affects some 29,000,000 American diabetics, or 9.3% of the population. (307) Lomustine, a 40-year old cancer drug, was sold to a new pharmaceutical company in 2013, it has since risen from \$50.00 per capsule to \$768.00 per pill, an increase of nearly 1,400%. (664) How can companies be allowed to charge such exorbitant amounts on life saving drugs? Do these scientists, doctors, and businesspersons who run these pharmaceutical giants have no morals, and only care about profits? Why are companies like Turing Pharmaceuticals allowed to obtain the sole manufacturing license for an antiparasitic drug like Daraprim, and engage in price gouging by increasing the price from \$13.50 USD per pill to \$750.00 USD per pill, while in Brazil the same drug is available for \$0.02 USD per pill? (409) An investigation by Reuters found that 4 of the most 10 prescribed drugs in the United States have increased in price by more than 100% since 2011, and that in 2014 sales for the 10 most prescribed drugs increased 44%, even though prescriptions for these same medications dropped 22%. Patient spending on pharmaceutical drugs also increased faster than doctor visits and hospitalization over a five-year period. (412)

List of Most Expensive Prescription Drugs	
Drug Name	Cost
Glybera	\$1,000,000 per year
Ravicti	\$794,000 per year (an estimated 2000 <i>Homo sapiens</i> in the United States suffer from this rare genetic disease, if each patient pays this exorbitant price it would be a total of: \$1,588,000,000.
Spinraza	\$750,000 for the first year and \$375,000 for each year after
Lumizyme	\$626,000 per year

Carbaglu	\$585,000 per year
Actimmune	\$572,000 per year
Soliris	\$543,000 per year (with an estimated 41,000 patients worldwide, if each patient pays this exorbitant price it would be a total of: \$22,263,000,000)
As of 2015 there were 90 other prescription drugs that each had an annual cost of \$100,000 or more, 5 of them costing more than \$400,000 per year.	
SOURCE: The Motley Fool – The 7 Most Expensive Prescription Drugs in the World - April 18, 2017 - https://www.fool.com/investing/2017/04/28/teva-pharmaceutical-is-looking-to-deal-and-thats-a.aspx	

Pharmaceutical companies have used unethical business schemes like: Medicaid Price Reporting, Best Price Fraud, CME Fraud, Off Label Marketing, Good Manufacturing Practice Violations, Manufactured Compound Drugs, and other methods to defraud the health care system in an effort to increase profits. From 2001 to 2013, there were many settlements made between pharmaceutical companies and the United States Department of Justice, the 22 largest settlements amounted to \$19,755,000,000 in fines. How can these companies continue to break the law with little or no real consequences?

Children today are often prescribed Ritalin, Adderall, or another experimental pharmaceutical concoction to correct behavioral problems. In 1990, there were 600,000 children that were taking stimulants like Ritalin, by 2013 the number increased to 3,500,000 children while the stimulant Ritalin was largely replaced by Adderall. (459) Worldwide, global Ritalin consumption was 2,400,000,000 doses in 2013. (461) About 83,000 prescriptions for Prozac, and almost 20,000 prescriptions for Risperdal, Seroquel, and other antipsychotic medications were written in 2014 for children that were 2 years old and younger. (460) Why is Ritalin, a drug that essentially has the same pharmacological properties as amphetamines, used to treat children with behavioral problems? Are these children's behavioral issues a result from social and environmental factors? (e.g. alcohol, drug, pesticide, or other chemical exposure during pregnancy, premature birth, low birth weight, vitamin or other nutritional deficiencies, social deprivation, neglect or abuse, etc.) Instead of prescription drugs, could the solution be in treating these children with behavior therapy, diet and lifestyle changes, and/or social changes? The January 2008 PBS Frontline program *'The Medicated Child'* documents the issue in depth.

Top 25 Most Prescribed Pharmaceutical Drugs in the United States - April 2014 to March 2015		
Prescription Drug	Total Prescriptions	Use
Synthroid	21,561,481	thyroid hormone deficiency
Crestor	21,478,776	high cholesterol and related conditions and to prevent cardiovascular disease
Ventolin HFA	18,203,939	asthma
Nexium	15,298,228	stomach acid reducer
Advair Diskus	13,776,325	asthma and chronic obstructive pulmonary disease
Lantus Solostar	10,939,840	diabetes
Vyvanse	10,413,999	attention deficit hyperactivity disorder (ADHD) and binge eating disorder
Lyrica	10,022,365	epilepsy, neuropathic pain, fibromyalgia, and generalized anxiety disorder
Spiriva Handihaler	9,635,935	asthma
Januvia	9,148,946	diabetes
Lantus	9,145,153	diabetes
Abilify	9,099,978	atypical antipsychotic
Symbicort	8,265,594	asthma and chronic obstructive pulmonary disease
Tamiflu	8,025,275	antiviral flu medication
Cialis	7,472,719	erectile dysfunction
Viagra	7,104,074	erectile dysfunction
Suboxone	6,985,631	used in the treatment of opioid dependence
Zetia	6,925,137	high cholesterol
Xarelto	6,739,752	preventing and treating blood clots
Bystolic	6,461,435	high blood pressure
Celebrex	6,449,730	pain and inflammation
Nasonex	6,432,382	inflammation
Namenda	5,961,360	Alzheimer's disease

Flovent HFA	5,736,650	asthma, allergic rhinitis, nasal polyps, various skin disorders and Crohn's disease and ulcerative colitis
Oxycontin	5,347,532	pain
Source: Medscape - 100 Best-Selling, Most Prescribed Branded Drugs Through March - by: Troy Brown, RN - May 06, 2015 - http://www.medscape.com/viewarticle/844317#vp_1		

The vast majority of prescription drugs used today are synthetic, with some even containing known chemicals that have adverse health effects for some patients who use them only once. Prolonged use of prescription drugs can also result in severe irreversible liver, kidney, or other bodily damage. There are no official statistics from the FDA, CDC, or any United States government agency for the total number of adverse drug reactions and adverse drug reaction deaths. There is however one study which analyzed data between 1966 and 1996, the study estimated that in 1994 there were 2,216,000 hospitalized patients that had a serious adverse drug reaction, while another 106,000 hospitalized patients had a fatal adverse drug reaction, making this an unreported and hidden leading cause of death. (458) These estimates do not include adverse drug reactions which occurred in a nursing home or in an ambulatory setting, which could add hundreds of thousands to the total. Why are adverse drug reaction deaths not a focal point for relative government agencies, hospitals, doctors, and patients? Why are no government statistics available on this issue, and why is there no system in place to record, track, and further investigate each adverse drug reaction incident? How can the government ignore such a prevalent issue within medicine? How many millions of adverse drug reactions occur worldwide? How many hundreds of thousands of deaths worldwide occur because of an adverse drug reaction? Why is there so much focus on the abuse and overdose deaths of prescription and illegal drugs, but so little attention given to a prescription drug which kills the patient it was intending to save? If the public was more aware of the real total number of adverse drug reactions and adverse drug reaction deaths which occur, would they take less prescription drugs? Have patients become the ultimate clinical trial for prescription drugs? Why would anyone take such a substance to cure something that can be done in a more natural way with flora, lifestyle changes, or physical therapy?

Prescription drug advertisements are presented in a soothing calm and happy voice when talking about not only the drug itself, but even the side effects, as if allergic reactions, drowsiness, nausea, vomiting, insomnia, heart palpitations, addiction, dependence, and other negative and even fatal side effects are normal and to be accepted. A recent study found that 32% of prescription drugs approved by the FDA had safety issues prompting either withdrawal of the drug from market, a box warning, or prompted a safety communication release. (346) Since the 1960's, many prescription drugs in the United States and Europe have been recalled due to adverse and sometimes previously unknown fatal side-effects. Why are so many highly addictive drugs prescribed so frequently? Why have so many drugs with known side-effects been allowed to reach consumers only to later be recalled? If 2 out of 1,000 patients experience a side-effect from taking a prescribed drug and the side-effect is a guaranteed statistical probability, then what use is a black box warning or other government warning? Is society being so heavily influenced by the medical establishment, corporations, and their advertising that they consume whatever is marketed towards them no matter how toxic and deadly it could possibly be?

Some Controversial Medications	
Drug	Description
Alosetron	Alosetron was withdrawn from the market in 2000 owing to the occurrence of serious life-threatening gastrointestinal adverse effects, but was reintroduced in 2002 with availability and use restricted. Alosetron was withdrawn from the market voluntarily by GlaxoWellcome on November 28, 2000 owing to the occurrence of serious life-threatening gastrointestinal adverse effects, including 5 deaths and additional bowel surgeries. The FDA said it had reports of 49 cases of ischemic colitis and 21 cases of "severe constipation" and that ten of the 70 patients underwent surgeries and 34 others were examined at hospitals and released without surgery. Severe adverse events continued to be reported, with a final total of 84 instances of ischaemic colitis, 113 of severe constipation, 143 admissions to hospital, and 7 deaths. It was the first drug returned to the U.S. market after withdrawal for safety concerns.
Amphetamine and Methamphetamine	In the United States, methamphetamine hydrochloride, under the trade name Desoxyn, has been approved by the FDA for treating ADHD and obesity in both adults and children; however, the FDA also indicates that the limited therapeutic usefulness of methamphetamine should be weighed against the inherent risks associated with its use. Methamphetamine is sometimes prescribed off label for narcolepsy and idiopathic hypersomnia. In the United States, methamphetamine's levorotary form is available in some over-the-counter (OTC) nasal decongestant products. As methamphetamine is associated with a high potential for misuse, the drug is regulated under the Controlled Substances Act and is listed under schedule II in the United States.

	<p>One of the earliest uses of amphetamine and methamphetamine was during World War II, when they were used by Axis and Allied forces. As early as 1919, Akira Ogata synthesized methamphetamine via reduction of ephedrine using red phosphorus and iodine. Later, the chemists Hauschild and Dobke from the German pharmaceutical company Temmler developed an easier method for converting ephedrine to methamphetamine. As a result, it was possible for Temmler to market it on a large scale as a nonprescription drug under the trade name Pervitin (methamphetamine hydrochloride). It was not until 1986 that Pervitin became a controlled substance, requiring a special prescription to obtain. Pervitin was commonly used by the German and Finnish militaries.</p> <p>It was widely distributed across German military ranks and divisions, from elite forces to tank crews and aircraft personnel, with many millions of tablets being distributed throughout the war for its performance enhancing stimulant effects and to induce extended wakefulness. Its use by German Tank (Panzer) crews also led to it being known as Panzerschokolade ("Tank-Chocolates"). It was also colloquially known among German Luftwaffe pilots as Stuka-Tabletten ("Stuka-Tablets") and Hermann-Göring-Pillen ("Herman-Göring-Pills"). More than 35 million three-milligram doses of Pervitin were manufactured for the German army and air force between April and July 1940. From 1942 until his death in 1945, Adolf Hitler was given intravenous injections of methamphetamine by his personal physician Theodor Morell. In Japan, methamphetamine was sold under the registered trademark of Philopon by Dainippon Pharmaceuticals (present-day Dainippon Sumitomo Pharma [DSP]) for civilian and military use. It has been estimated that one billion Phiporon pills were produced between 1939 and 1945. As with the rest of the world at the time, the side effects of methamphetamine were not well studied, and regulation was not seen as necessary. In the 1940s and 1950s, the drug was widely administered to Japanese industrial workers to increase their productivity. In Finland, Pervitin was colloquially known as höökipulveri ("pep powder"). Its use was essentially restricted to special forces, especially to long range commandos.</p> <p>Amphetamine was given to Allied bomber pilots during World War II to sustain them by fighting off fatigue and enhancing focus during long flights. During the Persian Gulf War, amphetamine became the drug of choice for American bomber pilots, being used on a voluntary basis by roughly half of U.S. Air Force pilots. The Tarnak Farm incident, in which an American F-16 pilot killed several friendly Canadian soldiers on the ground, was blamed by the pilot on his use of amphetamine. A nonjudicial (UCMJ Article 15) U.S. Air Force hearing rejected the pilot's claim.</p>
Aprotinin	<p>Under the trade name Trasylol, aprotinin was used as a medication administered by injection to reduce bleeding during complex surgery, such as heart and liver surgery. Its main effect is the slowing down of fibrinolysis, the process that leads to the breakdown of blood clots. The aim in its use was to decrease the need for blood transfusions during surgery, as well as end-organ damage due to hypotension (low blood pressure) as a result of marked blood loss. The drug was temporarily withdrawn worldwide in 2007 after studies suggested that its use increased the risk of complications or death; this was confirmed by follow-up studies. Trasylol sales were suspended in May 2008, except for very restricted research use. In February 2012 the European Medicines Agency (EMA) scientific committee reverted its previous standpoint regarding aprotinin, and has recommended that the suspension be lifted. Nordic became distributor of aprotinin in 2012. On October 25, 2007, the FDA issued a statement regarding the "Blood conservation using antifibrinolytics" (BART) randomized trial in a cardiac surgery population. The preliminary findings suggest that, compared to other antifibrinolytic drugs (epsilon-aminocaproic acid and tranexamic acid) aprotinin may increase the risk of death. On October 29, 2006 the Food and Drug Administration issued a warning that aprotinin may have serious kidney and cardiovascular toxicity. The producer, Bayer, reported to the FDA that additional observation studies showed that it may increase the chance for death, serious kidney damage, congestive heart failure and strokes. FDA warned clinicians to consider limiting use to those situations where the clinical benefit of reduced blood loss is essential to medical management and outweighs the potential risks. On November 5, 2007, Bayer announced that it was withdrawing Aprotinin because of a Canadian study that showed it increased the risk of death when used to prevent bleeding during heart surgery.</p>
Benoxaprofen	<p>Benoxaprofen, also known as Benoxaphen, is a non-steroidal anti-inflammatory drug and was marketed under the brand name Oraflex in the United States and as Opren in Europe by Eli Lilly and Company. Lilly suspended sales of Oraflex in 1982 after reports from the British government and the U.S. Food and Drug Administration (FDA) of adverse effects and deaths linked to the drug. When benoxaprofen was on the market as Oraflex in the USA the first sign of trouble came for the Lilly Company. The British Medical Journal reported in May 1982 that physicians in the UK believed that the drug was responsible for at least 12 deaths, mainly caused by kidney and liver failure. A petition was filed to have Oraflex removed from the market. On the fourth of August 1982 the British government temporarily suspended sales of the drug in UK 'on grounds of safety'. The British Committee on the Safety of Medicines declared, in a telegram to the FDA, that it had received reports of more than 3,500 adverse side-effects among patients who had used Oraflex. There were also 61 deaths, most of which were of elderly people. Almost simultaneously, the FDA said it had reports of 11 deaths in the USA among Oraflex users, most of which were caused by kidney and liver damage.</p>
Cerivastatin	<p>Cerivastatin is a synthetic member of the class of statins used to lower cholesterol and prevent cardiovascular disease. It was marketed by the pharmaceutical company Bayer A.G. in the late 1990s, competing with</p>

	<p>Pfizer's highly successful atorvastatin (Lipitor). Cerivastatin was voluntarily withdrawn from the market worldwide in 2001, due to reports of fatal rhabdomyolysis. During postmarketing surveillance, 52 deaths were reported in patients using cerivastatin, mainly from rhabdomyolysis and its resultant renal failure</p>
Dexfenfluramine	<p>Dexfenfluramine was, for some years in the mid-1990s, approved by the United States Food and Drug Administration for the purposes of weight loss. However, following multiple concerns about the cardiovascular side-effects of the drug, the FDA withdrew the approval in 1997. After it was removed in the US, dexfenfluramine was also pulled out in other global markets. It was later superseded by sibutramine, which, although initially considered a safer alternative to both dexfenfluramine and fenfluramine, was likewise removed from the US market in 2010.</p>
Dextropropoxyphene	<p>Dextropropoxyphene is an analgesic in the opioid category, it is intended to treat mild pain and also has antitussive (cough suppressant) and local anaesthetic effects. The drug has been taken off the market in Europe and the US due to concerns of fatal overdoses and heart arrhythmias. Dextropropoxyphene is subject to some controversy: while many physicians prescribe it for a wide range of mildly to moderately painful symptoms, as well as for treatment of diarrhea, many others refuse to prescribe it, citing limited effectiveness. In addition, the therapeutic index of dextropropoxyphene is relatively narrow.</p> <p>Caution should be used when administering dextropropoxyphene, particularly with children and the elderly and with patients who may be pregnant or breast feeding; other reported problems include kidney, liver or respiratory disorders, and prolonged use. Attention should be paid to concomitant use with tranquilizers, antidepressants or excess alcohol. Darvon, a dextropropoxyphene formulation made by Eli Lilly, which had been on the market for 25 years, came under heavy fire in 1978 by consumer groups that said it was associated with suicide. Darvon was never withdrawn from the market, until recently. But Lilly has waged a sweeping, and largely successful, campaign among doctors, pharmacists and Darvon users to defend the drug as safe when it is used in proper doses and not mixed with alcohol. After determining the risks outweigh the benefits, the USFDA requested physicians stop prescribing the drug. On November 19, 2010 the FDA announced that Xanodyne Pharmaceuticals agreed to withdraw Darvon and Darvocet in the United States, followed by manufacturers of dextropropoxyphene.</p>
Diethylstilbestrol	<p>Diethylstilbestrol is a synthetic, non-steroidal estrogen of the stilbestrol group that was first synthesized in 1938. It is also classified as an endocrine disruptor. Human exposure to DES occurred through diverse sources, such as dietary ingestion from supplemented cattle feed and medical treatment for certain conditions, including breast and prostate cancers. From about 1940 to 1971, DES was given to pregnant women in the mistaken belief it would reduce the risk of pregnancy complications and losses.</p> <p>In 1971, DES was shown to cause clear cell carcinoma, a rare vaginal tumor in girls and women who had been exposed to this drug in utero. The United States Food and Drug Administration subsequently withdrew approval of DES as a treatment for pregnant women. Follow-up studies have indicated that DES also has the potential to cause a variety of significant adverse medical complications during the lifetimes of those exposed. The United States National Cancer Institute recommends women born to mothers who took DES undergo special medical exams on a regular basis to screen for complications as a result of the drug.</p> <p>The greatest usage of DES was in the livestock industry, used to improve feed conversion in beef and poultry. During the 1960s, DES was used as a growth hormone in the beef and poultry industries. It was later found to cause cancer by 1971, but was not phased out until 1979. When DES was discovered to be harmful to humans, it was moved to veterinary use.</p>
Fenfluramine and Phentermine	<p>The drug combination fenfluramine/phentermine, usually called fen-phen, was an anti-obesity treatment that utilized two anorectics. Fenfluramine was marketed by American Home Products (later known as Wyeth) as Pondimin, but was shown to cause potentially fatal pulmonary hypertension and heart valve problems, which eventually led to its withdrawal and legal damages of over \$13 billion. Phentermine was not shown to have harmful effects.</p>
Lysergic Acid Diethylamide	<p>Lysergic acid diethylamide (LSD), also known as acid, is a psychedelic drug known for its psychological effects. This may include altered awareness of the surroundings, perceptions, and feelings as well as sensations and images that seem real though they are not. In the 1950s and 1960s LSD was used in psychiatry to enhance psychotherapy known as psychedelic therapy. Some psychiatrists[who?] believed LSD was especially useful at helping patients to "unblock" repressed subconscious material through other psychotherapeutic methods, and also for treating alcoholism. One study concluded, "The root of the therapeutic value of the LSD experience is its potential for producing self-acceptance and self-surrender," presumably by forcing the user to face issues and problems in that individual's psyche. Two recent reviews concluded that conclusions drawn from most of these early trials are unreliable due to serious methodological flaws. These include the absence of adequate control groups, lack of followup, and vague criteria for therapeutic outcome. In many cases studies failed to convincingly demonstrate whether the drug or the therapeutic interaction was responsible for any beneficial effects.</p>
Methaqualone	<p>Methaqualone, sold under the brand name Quaalude. The sedative–hypnotic activity of methaqualone was first noted by researchers in the 1950s. In 1962, methaqualone was patented in the US by Wallace and Tiernan. By 1965, it was the most commonly prescribed sedative in Britain, where it has been sold legally under the names Malsed, Malsedin, and Renoval. In 1965, a methaqualone/antihistamine combination was</p>

	<p>sold as the sedative drug Mandrax, by Roussel Laboratories (now part of Sanofi-Aventis). In 1972, it was the sixth-best-selling sedative in the US, where it was legal under the brand name Quaalude. Its use peaked in the early 1970s as a hypnotic, for the treatment of insomnia, and as a sedative and muscle relaxant. Methaqualone peaks in the bloodstream within several hours, with a half-life of 20–60 hours. Regular users build up a physical tolerance, requiring larger doses for the same effect. Overdose can lead to nervous system shutdown, coma and death. An overdose can cause delirium, convulsions, hypertonia, hyperreflexia, vomiting, kidney failure, coma, and death through cardiac or respiratory arrest. It resembles barbiturate poisoning, but with increased motor difficulties and a lower incidence of cardiac or respiratory depression. The standard one tablet adult dose of Quaalude was 300 mg when made by Lemmon. A dose of 8000 mg is lethal and a dose as little as 2000 mg could induce a coma if taken with an alcoholic beverage.</p>
Methylhexanamine	<p>Methylhexanamine (trade names Forthane, Geranamine) or methylhexamine, commonly known as 1,3-dimethylamylamine (1,3-DMAA) or simply dimethylamylamine (DMAA), is an indirect sympathomimetic drug invented and developed by Eli Lilly and Company and marketed as an inhaled nasal decongestant from 1944 until it was voluntarily withdrawn from the market in 1983.</p> <p>Since 2006 methylhexanamine has been sold extensively under many names as a stimulant or energy-boosting dietary supplement under the claim that it is similar to certain compounds found in geraniums, but its safety has been questioned as a number of adverse events and at least five deaths have been associated with methylhexanamine-containing supplements. It is banned by many sports authorities and governmental agencies. The FDA has stated that methylhexanamine "is known to narrow the blood vessels and arteries, which can elevate blood pressure and may lead to cardiovascular events ranging from shortness of breath and tightening in the chest to heart attack." Numerous adverse events and at least five deaths have been reported in association with methylhexanamine-containing dietary supplements.</p>
Natalizumab	<p>Natalizumab is used in the treatment of multiple sclerosis and Crohn's disease. Natalizumab was approved in 2004 by the U.S. Food and Drug Administration (FDA). It was subsequently withdrawn from the market by its manufacturer after it was linked with three cases of the rare neurological condition progressive multifocal leukoencephalopathy (PML) when administered in combination with interferon beta-1a, another immunosuppressive drug often used in the treatment of multiple sclerosis. After a review of safety information and no further deaths, the drug was returned to the US market in 2006 under a special prescription program. As of June 2009, ten cases of PML were known. However, twenty-four cases of PML had been reported since its reintroduction by October 2009, showing a sharp rise in the number of fatalities and prompting a review of the chemical for human use by the European Medicines Agency. By January 2010, 31 cases of PML were attributed to natalizumab. The FDA did not withdraw the drug from the market because its clinical benefits outweigh the risks involved.</p>
Obetrol	<p>Obetrol was the brand of amphetamine mixed salts based drugs indicated for treatment of exogenous obesity by the American pharmaceutical company Obetrol Pharmaceuticals. Obetrol was a popular diet pill in America in the 1950s and 1960s. A formulation of amphetamine mixed salts that included methamphetamine was approved by the U.S. Food and Drug Administration (FDA) on January 19, 1960 under the name Obetrol. Between 1965 and 1973, this formula was offered in 10 mg and 20 mg strength through Obetrol Pharmaceuticals division of an American pharmaceutical company Rexar under the trade name Obetrol. Its indication was for exogenous obesity. Obetrol was withdrawn from the market in 1973 under DESI statute. Rexar reformulated Obetrol to exclude methamphetamine and continued to sell this new formulation under the same Obetrol brand name. This new unapproved formulation was later rebranded and sold as Adderall by Richwood after it acquired Rexar resulting in FDA warning in 1994. When Richwood acquired Rexar, the drug's name was changed from Obetrol to Adderall, and the drug was marketed for use in the treatment of Attention Deficit Disorder (in both children and adults).</p>
Oxymorphone	<p>Oxymorphone, sold under the brand names Numorphan among others, is a powerful semi-synthetic opioid analgesic (painkiller) developed 1914 in Germany. In June 2017, the FDA asked Endo Pharmaceuticals to remove Opana ER from the US market, because vis a vis the opioid epidemic the drug's benefits may no longer outweigh its risks, this being the first time the agency has taken steps to remove a currently marketed opioid pain medication from sale due to public health consequences of abuse.</p>
Phenformin	<p>Phenformin is an antidiabetic drug from the biguanide class. It was marketed as DBI by Ciba-Geigy, but was withdrawn from most markets in the late 1970s due to a high risk of lactic acidosis, which was fatal in 50% of cases. Phenformin sales began to decline in the US from 1973 due to negative trial studies and reports of lactic acidosis. By October 1976, the FDA Endocrinology and Metabolism Advisory Committee recommended phenformin be removed from the market. The FDA began formal proceedings in May 1977, leading to its eventual withdrawal on November 15, 1978.</p>
Rimonabant	<p>Rimonabant (trade names Acomplia, Zimulti) was an anorectic antiobesity drug that was first approved in Europe in 2006 but was withdrawn worldwide in 2008 due to serious psychiatric side effects; it was never approved in the United States. Rimonabant is an inverse agonist for the cannabinoid receptor CB1 and was the first drug approved in that class. In October 2008, the European Medicines Agency recommended the suspension of Acomplia after the Committee for Medicinal Products for Human Use (CHMP) had determined that the risks of Acomplia outweighed its benefits due to the risk of serious psychiatric problems, including suicide.</p>
Rofecoxib	<p>Rofecoxib is a nonsteroidal anti-inflammatory drug (NSAID) that has now been withdrawn over safety</p>

	<p>concerns. It was marketed by Merck & Co. to treat osteoarthritis, acute pain conditions, and dysmenorrhea. Rofecoxib was approved by the U.S. Food and Drug Administration (FDA) on May 20, 1999, and was marketed under the brand names Vioxx, Ceoxx, and Ceeoxx. Rofecoxib gained widespread acceptance among physicians treating patients with arthritis and other conditions causing chronic or acute pain. Worldwide, over 80 million people were prescribed rofecoxib at some time. On September 30, 2004, Merck withdrew rofecoxib from the market because of concerns about increased risk of heart attack and stroke associated with long-term, high-dosage use. Merck withdrew the drug after disclosures that it withheld information about rofecoxib's risks from doctors and patients for over five years, resulting in between 88,000 and 140,000 cases of serious heart disease. Rofecoxib was one of the most widely used drugs ever to be withdrawn from the market. In the year before withdrawal, Merck had sales revenue of US\$2.5 billion from Vioxx. Merck reserved \$970 million to pay for its Vioxx-related legal expenses through 2007, and has set aside \$4.85bn for legal claims from US citizens.</p>
Rosiglitazone	<p>Rosiglitazone (trade name Avandia) is an antidiabetic drug in the thiazolidinedione class. It works as an insulin sensitizer, by binding to the PPAR in fat cells and making the cells more responsive to insulin. It is marketed by the pharmaceutical company GlaxoSmithKline (GSK) as a stand-alone drug or for use in combination with metformin or with glimepiride. First released in 1999, annual sales peaked at approximately \$2.5-billion in 2006; however, following a meta-analysis published in the New England Journal of Medicine in 2007 that linked the drug's use to an increased risk of heart attack, sales plummeted to just \$9.5-million in 2012. The drug's patent expired in 2012.</p> <p>Despite rosiglitazone's effectiveness at decreasing blood sugar in type 2 diabetes mellitus, its use decreased dramatically as studies showed apparent associations with increased risks of heart attacks and death. Adverse effects alleged to be caused by rosiglitazone were the subject of over 13,000 lawsuits against GSK; as of July 2010, GSK had agreed to settlements on more than 11,500 of these suits. In Europe, the European Medicines Agency (EMA) recommended in September 2010 that the drug be suspended from the European market because the benefits of rosiglitazone no longer outweighed the risks. It was withdrawn from the market in the UK and India in 2010, and in New Zealand and South Africa in 2011.</p> <p>In 2012, the U.S. Justice Department announced GlaxoSmithKline had agreed to plead guilty and pay a \$3 billion fine, in part for withholding the results of two studies of the cardiovascular safety of Avandia between 2001 and 2007. The settlement stems from claims made by four employees of GlaxoSmithKline, including a former senior marketing development manager for the company and a regional vice president, who tipped off the government about a range of improper practices from the late 1990s to the mid-2000s.</p> <p>Following the reports in 2007 that Avandia can significantly increase the risk of heart attacks, the drug has been controversial. A 2010 article in Time uses the Avandia case as evidence of a broken FDA regulatory system that "may prove criminal as well as fatal". It details the disclosure failures, adding, "Congressional reports revealed that GSK sat on early evidence of the heart risks of its drug, and that the FDA knew of the dangers months before it informed the public." It reports, "the FDA is investigating whether GSK broke the law by failing to fully inform the agency of Avandia's heart risks", according to deputy FDA commissioner Dr. Joshua Sharfstein. GSK threatened academics who reported adverse research results, and received multiple warning letters from the FDA for deceptive marketing and failure to report clinical data. The maker of the drug, GlaxoSmithKline, has dealt with serious backlash against the company for the drug's controversy. Sales on the drug dropped significantly after the story first broke in 2007, dropping from \$2.5 billion in 2006 to less than \$408 million in 2009 in the US.</p>
Sibutramine	<p>Sibutramine (usually in the form of the hydrochloride monohydrate salt) is an oral anorexiant. It was sold under a variety of brand names including Reductil, Meridia, Siredia, and Sibutrex. Until 2010 it was marketed and prescribed as an adjunct in the treatment of exogenous obesity along with diet and exercise. It has been associated with increased cardiovascular events and strokes and has been withdrawn from the market in several countries and regions including Australia, Canada, China, the European Union (EU), Hong Kong, India, Mexico, New Zealand, the Philippines, Thailand, the United Kingdom, and the United States.</p>
Temafloxacin	<p>Temafloxacin (marketed by Abbott Laboratories as Omniflox) is a fluoroquinolone antibiotic drug which was withdrawn from sale in the United States shortly after its approval. Omniflox was approved to treat lower respiratory tract infections, genital and urinary infections like prostatitis, and skin infections in the United States by the Food and Drug Administration in January 1992. Severe adverse reactions, including allergic reactions and hemolytic anemia, developed in over 100 patients during the first four months of its use, leading to three patient deaths. Abbott withdrew the drug from sale in June 1992.</p>
Thalidomide	<p>Thalidomide was first marketed in 1957 in West Germany under the trade-name Contergan. The German drug company Chemie Grünenthal developed and sold the drug. Primarily prescribed as a sedative or hypnotic, thalidomide also claimed to cure "anxiety, insomnia, gastritis, and tension". Afterwards, it was used against nausea and to alleviate morning sickness in pregnant women. Thalidomide became an over-the-counter drug in West Germany on October 1, 1957. Shortly after the drug was sold in West Germany, between 5,000 and 7,000 infants were born with phocomelia (malformation of the limbs). Only 40% of these children survived. Throughout the world, about 10,000 cases were reported of infants with phocomelia due to thalidomide; only 50% of the 10,000 survived. Those subjected to thalidomide while in the womb experienced limb deficiencies</p>

	<p>in a way that the long limbs either were not developed or presented themselves as stumps. Other effects included deformed eyes and hearts, deformed alimentary and urinary tracts, blindness and deafness. The negative effects of thalidomide led to the development of more structured drug regulations and control over drug use and development.</p> <p>In the late 1950s and early 1960s, more than 10,000 children in 46 countries were born with deformities such as phocomelia as a consequence of thalidomide use. The severity and location of the deformities depended on how many days into the pregnancy the mother was before beginning treatment; thalidomide taken on the 20th day of pregnancy caused central brain damage, day 21 would damage the eyes, day 22 the ears and face, day 24 the arms, and leg damage would occur if taken up to day 28. Thalidomide did not damage the fetus if taken after 42 days gestation. It is not known exactly how many worldwide victims of the drug there have been, although estimates range from 10,000 to 20,000 to 100,000. Despite the side effects, thalidomide was sold in pharmacies in Canada until 1962. In the United Kingdom, the drug was licensed in 1958 and withdrawn in 1961. Of the approximately 2,000 babies born with defects, around half died within a few months and 466 survived to at least 2010. In Spain, thalidomide was widely available throughout the 1970s, perhaps even into the 1980s. There were two reasons for this. First, state controls and safeguarding were poor; indeed, it was not until 2008 that the government even admitted the country had ever imported thalidomide. Second, Grünenthal failed to insist that its sister company in Madrid warn Spanish doctors, and permitted it to not warn them. The Spanish advocacy group for victims of thalidomide estimates that in 2015, there were 250–300 living victims of thalidomide in Spain.</p>
Tienilic acid	Tienilic acid (INN and BAN) or ticrynafen (USAN) is a loop diuretic drug with uric acid-lowering (uricosuric) action, formerly marketed for the treatment of hypertension. It was approved by FDA on May 2, 1979, and withdrawn in 1982, after case reports in the United States indicated a link between the use of ticrynafen and hepatitis. Criminal charges were brought against SmithKline executives with regard to hiding data related to toxicity while gaining FDA approval. The company pleaded guilty to 14 counts of failure to report adverse reactions and 20 counts of selling a misbranded drug.
Triparanol	Triparanol was patented in 1959 and introduced in the United States in 1960, was the first synthetic cholesterol-lowering drug. It was withdrawn in 1962 due to severe adverse effects such as nausea and vomiting, vision loss due to irreversible cataracts, alopecia, skin disorders (e.g., dryness, itching, peeling, and "fish-scale" texture), and accelerated atherosclerosis and is now considered to be obsolete
Troglitazone	Troglitazone (Rezulin, Resulin, Romozin, Noscalt) is an antidiabetic and anti-inflammatory drug, and a member of the drug class of the thiazolidinediones. It was prescribed for patients with diabetes mellitus type 2. It was developed by Daiichi Sankyo (Japan). In the United States, it was introduced and manufactured by Parke-Davis in the late 1990s, but turned out to be associated with an idiosyncratic reaction leading to drug-induced hepatitis. The FDA medical officer assigned to evaluate troglitazone, John Gueriguian, did not recommend its approval due to potential high liver toxicity; Parke-Davis complained to the FDA and Gueriguian was subsequently removed from his post. A full panel of experts approved it in January 1997. Once the prevalence of adverse liver effects became known, troglitazone was withdrawn from the British market in December 1997, from the United States market in 2000, and from the Japanese market soon afterwards. It did not get approval in the rest of Europe. On March 21, 2000, the FDA withdrew the drug from the market. Dr. Robert I. Misbin, an FDA medical officer, wrote in a July 3, 2000 letter to the House Energy and Commerce Committee of strong evidence that Rezulin could not be used safely, after having been threatened by the FDA with dismissal in March 2000. By that time the drug had been linked to 63 liver-failure deaths and had generated sales of more than \$2.1 billion for Warner-Lambert
Trovafloxacin	Trovafloxacin (sold as Trovan by Pfizer and Turvel by Laboratorios Almirall) was a broad spectrum antibiotic that inhibits the uncoiling of supercoiled DNA in various bacteria by blocking the activity of DNA gyrase and topoisomerase IV. It was withdrawn from the market due to the risk of hepatotoxicity. In 1996, during a meningitis epidemic in Kano, Nigeria, the drug was administered to approximately 200 infected children. Eleven children died in the trial: five after taking Trovan and six after taking an older antibiotic used for comparison in the clinical trial. Others suffered blindness, deafness and brain damage, common sequelae of meningitis that have not been seen in patients treated with trovafloxacin for other infection types. An investigation by the Washington Post concluded that Pfizer had administered the drug as part of an illegal clinical trial without authorization from the Nigerian government or consent from the children's parents. The case came to light in December 2000 as the result of an investigation by The Washington Post, and sparked significant public outcry.
Valdecoxib	Valdecoxib is a non-steroidal anti-inflammatory drug (NSAID) used in the treatment of osteoarthritis, rheumatoid arthritis, and painful menstruation and menstrual symptoms. It is a selective cyclooxygenase-2 inhibitor. Valdecoxib was manufactured and marketed under the brand name Bextra by G. D. Searle & Company as an anti-inflammatory arthritis drug. It was approved by the United States Food and Drug Administration on November 20, 2001, to treat arthritis and menstrual cramps. and was available by prescription in tablet form until 2005 when the FDA requested that Pfizer withdraw Bextra from the American market. The FDA cited "potential increased risk for serious cardiovascular (CV) adverse events," an "increased risk of serious skin reactions" and the "fact that Bextra has not been shown to offer any unique advantages over the other available NSAIDs." In September 2009 Bextra was at the center of the "largest health care fraud settlement and the largest criminal fine of any kind ever." Pfizer paid a \$2.3 billion civil and

	criminal fine. Pharmacia and Upjohn, a Pfizer subsidiary, violated the United States Food, Drug and Cosmetic Act for misbranding Bextra "with the intent to defraud or mislead."
Zolpidem	<p>Zolpidem (originally marketed as Ambien and available worldwide under many brand names) is a sedative primarily used for the treatment of insomnia. It works quickly, usually within 15 minutes, and has a short half-life of two to three hours. Zolpidem has not adequately demonstrated effectiveness in maintaining sleep, unless delivered in a controlled-release (CR) form. However, it is effective in initiating sleep. Zolpidem addresses sleep-initiation problems, but is not effective in maintaining sleep. Also, a 2012 NIH study showed that zolpidem's effectiveness is nearly as much due to psychological effects as to the drug itself, so "increased attention should be directed at psychological intervention of insomnia."</p> <p>Some users have reported unexplained sleepwalking while using zolpidem, as well as sleep driving, Night eating syndrome while asleep, and performing other daily tasks while sleeping. Research by Australia's National Prescribing Service found these events occur mostly after the first dose taken, or within a few days of starting therapy. Rare reports of sexual parasomnia (sleep sex) episodes related to zolpidem intake have also been reported. Sleepwalkers can sometimes perform these tasks as normally as they might if they were awake. Residual 'hangover' effects, such as sleepiness and impaired psychomotor and cognitive function, may persist into the day following nighttime administration. Such effects may impair the ability of users to drive safely and increase risks of falls and hip fractures. In February 2008, the Australian Therapeutic Goods Administration attached a boxed warning to zolpidem, stating that "Zolpidem may be associated with potentially dangerous complex sleep-related behaviors that may include sleep walking, sleep driving, and other bizarre behaviours.</p> <p>The United States Air Force uses zolpidem as one of the hypnotics approved as a "no-go pill" (with a 6-hour restriction on subsequent flight operation) to help aviators and special duty personnel sleep in support of mission readiness. (The other hypnotics used are temazepam and zaleplon.) "Ground tests" are required prior to authorization issued to use the medication in an operational situation.</p>
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Death and other Medical Statistics

It should be noted that many low- and middle-income countries do not have systems in place for collecting information on causes of death, so all worldwide estimates are based on incomplete data and could be much higher. Of the 56,400,000 deaths worldwide in 2015, heart disease and stroke accounted for 15,000,000 deaths and they have been the leading causes of death globally for the last 15 years. Chronic obstructive pulmonary disease killed 3,200,000 *Homo sapiens*, diabetes killed 1,600,000 *Homo sapiens*, tuberculosis killed 1,400,000 *Homo sapiens*, and there were an estimated 1,400,000 *Homo sapiens* worldwide that died from a diarrheal disease. In low-income countries 52% of all deaths in 2015 were caused by communicable diseases. (358) (e.g. maternal causes, conditions arising during pregnancy and childbirth, and nutritional deficiencies) The World Health Organization (WHO) reported that environmental risks, (e.g. indoor and outdoor air pollution, second-hand smoke, unsafe water, lack of sanitation, and inadequate hygiene) take the lives of 1,700,000 children under 5 years of age every year, which equates to 3 children dying every minute of easily preventable causes. (383) How can easily preventable diseases and medical conditions still claim the lives of so many? UNICEF reported that,

"About 29,000 children under the age of five – 21 each minute – die every day, mainly from preventable causes. More than 70 per cent of almost 11 million child deaths every year are attributable to six causes: diarrhoea, malaria, neonatal infection, pneumonia, preterm delivery, or lack of oxygen at birth." (204)

A 2015 WHO report concluded that noncommunicable diseases (NCD) were the leading cause of death worldwide. The report stated,

"In 2012, an estimated 52% of all deaths under age 70 was due to NCDs, and two thirds of those deaths were caused by cardiovascular diseases (CVD), cancer, diabetes and chronic respiratory disease (CRD)."

"NCDs are estimated to kill around 38 million people per year, accounting for 68% of all deaths worldwide,¹ and the main NCDs (CVD, cancers, CRD and diabetes), taken singly, are among the top 10 leading killers. Nearly 80% of NCD deaths – 30 million – occurs in low-, middle- and non-OECD high-income countries, where NCDs are fast replacing infectious diseases and malnutrition as the leading causes of disability and premature death. Despite their obvious and growing significance, NCDs have long been hidden, misunderstood and underrecorded. They were passed over in the MDGs, which, by focusing attention on other issues, may have actually contributed to the sidelining of this core public health concern in

global health."

"In terms of mortality, the leading NCD is cardiovascular disease (CVD), which claimed 17.5 million lives in 2012 (46% of all NCD deaths), 6 million of which were people under age 70 Of those 17.5 million deaths, 7.4 million were due to coronary heart disease (heart attacks) and 6.7 million to stroke. Cancers kill around half as many (8.2 million, with 4.3 million under age 70), while CRD and diabetes accounted for 4.0 million and 1.5 million deaths, respectively.¹ Diabetes is also a risk factor for CVD, with about 11% of cardiovascular deaths attributed to high blood glucose."

"Globally, the prevalence of diabetes continues to increase The leading risk factors for type 2 diabetes are excess body weight and physical inactivity. Diabetes is highly correlated with the global prevalence of obesity, which has nearly doubled since 1980. In 2014, 11% of men and 15% of women age 18 and older were obese, while more than 42 million children under five years were overweight in 2013 It is encouraging to note, however, that a few high-income countries have managed to slow or halt the increase in obesity prevalence in children,^{14,15} which may eventually help to stabilize diabetes prevalence. In 2012, diabetes was the direct cause of 1.5 million deaths (4% of all NCD deaths), 46% of which occurred under age 70."

"Many of the products associated with the development of NCDs make companies money...Globalization of marketing and trade offers unprecedented opportunities for companies to promote products leading to tobacco use, harmful use of alcohol, consumption of food that is high in fat, especially saturated and trans fats, sugars, and salt/sodium, and sedentary lifestyles, often taking advantage of the weaker regulatory frameworks in many low- and middle-income countries." (413)

Cancer can be caused by physical, chemical, or oncogenic carcinogens, and while it is often very difficult to find the exact source of the cancer, most evidence will point to something the victim was exposed to throughout their lifetime, sometimes even being self-inflicted through dietary or other lifestyle choices. As there are so many agents in the world which can cause cancer, and too often there is very little investigation done into the cause of the cancer, the cause usually remains a mystery. Worldwide cancer is the second leading cause of death claiming 8,800,000 lives in 2015. In 2012, more than 14,000,000 new cancer cases were diagnosed, and this number is expected to rise by 70% over the next 2 decades. (607) While much research has been done, and new technologies can now be used to help with early diagnosis and control, no cure exists utilizing modern-day mainstream medicine. Is there a direct or even indirect connection between the use of some toxic chemicals and exploding cancer rates over the last 100 years? If there never really is a direct connection to these toxic chemicals, will they ever be seen as one of the possible sources of this cancer epidemic?

In the United States, an estimated 30,200,000 adults aged 18 years or older had diabetes in 2015, while an estimated 84,000,000 adults aged 18 years or older had prediabetes, equating to 46.1% of the adult population. (436) Again, one might be led to believe that there is a serious problem with the society's food sources and lifestyle choices when 46.1% of the United States adult population has diabetes or prediabetes. Worldwide, over 50% of indigenous adults over the age of 35 have type 2 diabetes. (494)

Leading Causes of Death in United States	
Cause of Death	Total Deaths Per Year
Heart disease	614,348
Cancer	591,699
Chronic lower respiratory diseases	147,101
Accidents (unintentional injuries)	136,053
Stroke (cerebrovascular diseases)	133,103
Adverse Drug Reaction (1998 Estimated no official or updated statistics) (458)	106,000
Alzheimer's disease	93,541
Diabetes	76,488
Drug Overdose (heroin, natural and semi-synthetic opioids, methadone, synthetic opioids excluding methadone, cocaine, or psychostimulants with abuse potential) (535)	64,070
Influenza and pneumonia	55,227
Nephritis, nephrotic syndrome, and nephrosis	48,146
Intentional self-harm (suicide)	42,773
Source: CDC National Center for Health Statistics - Health, United States, 2015: With Special Feature on Racial and Ethnic Health Disparities Hyattsville, MD.2016. Library of Congress Catalog Number 76-641496 - https://www.cdc.gov/nchs/data/atus/atus15.pdf	

(458) Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies - April 15, 1998 - by: Lazarou J, Pomeranz BH, and Corey PN - <https://www.ncbi.nlm.nih.gov/pubmed/9555760>

(535) CDC • National Center for Health Statistics • National Vital Statistics System - PROVISIONAL COUNTS OF DRUG OVERDOSE DEATHS, as of 8/6/2017 - https://www.cdc.gov/nchs/data/health_policy/monthly-drug-overdose-death-estimates.pdf

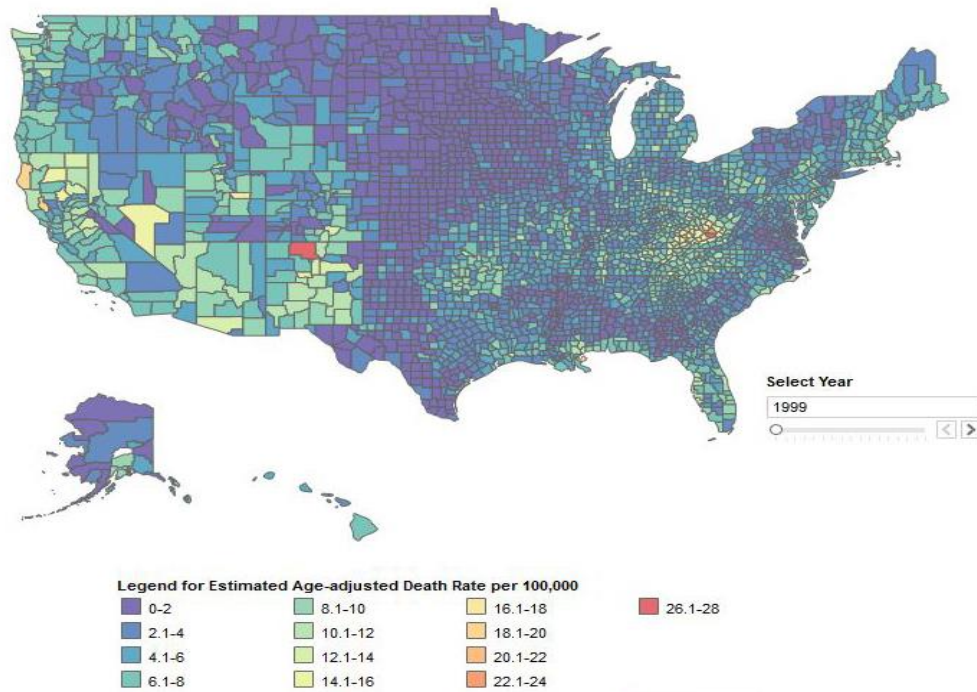
Mental Health and Drug Addiction

In 2013, there were 61,700,000 Americans that visited a physician's office with a mental disorder as the primary diagnosis. (443) In addition, another 4,700,000 Americans visited an emergency department with a mental disorder as the primary diagnosis. (444) Very few species on Earth have ever been observed committing suicide, and it is often a result of *Homo sapiens* confining a species and causing so much stress that it refuses to eat and just simply shuts down losing the will to live, and ultimately dies of sadness. *Homo sapiens* are the only species on Earth that commit suicide on a mass scale. In 2012, an estimated 804,000 *Homo sapiens* committed suicide globally. (413) What does it say about a society when 804,000 members of society lose the will to live from sadness, anger, or another emotion ultimately committing suicide? When the members of a society begin to commit suicide perhaps there is something seriously wrong within parts of the society itself.

In December 2016, after releasing videos in which she talked about being bullied at school and being sexually and physically abused by her stepfather, 12-year old Katelyn Nicole Davis live streamed her suicide on social media. Less than a month later on January 26, 2017, two days after having been beaten by fellow students and found unconscious in a school bathroom, 8-year-old Gabriel Taye committed suicide. Later that year on March 14, 2017 an 11-year-old boy committed suicide after his girlfriend faked her own death. Then on June 14, 2017, after being taunted at school and on social media, 12-year-old Mallory Grossman committed suicide. A similar bullying situation in South Carolina resulted in 11-year-old Toni Rivers committing suicide on October 25, 2017, and another incident in California of prolonged bullying over years eventually led to 13-year-old Rosalie Avile hanging herself in December 2017. Have children become so disconnected with their friends, parents, or other mentors that they commit suicide instead of getting help from an adult? What does it say about society when children are taught and allowed to bully other children to the point of suicide? What does it say about society when children are committing suicide?

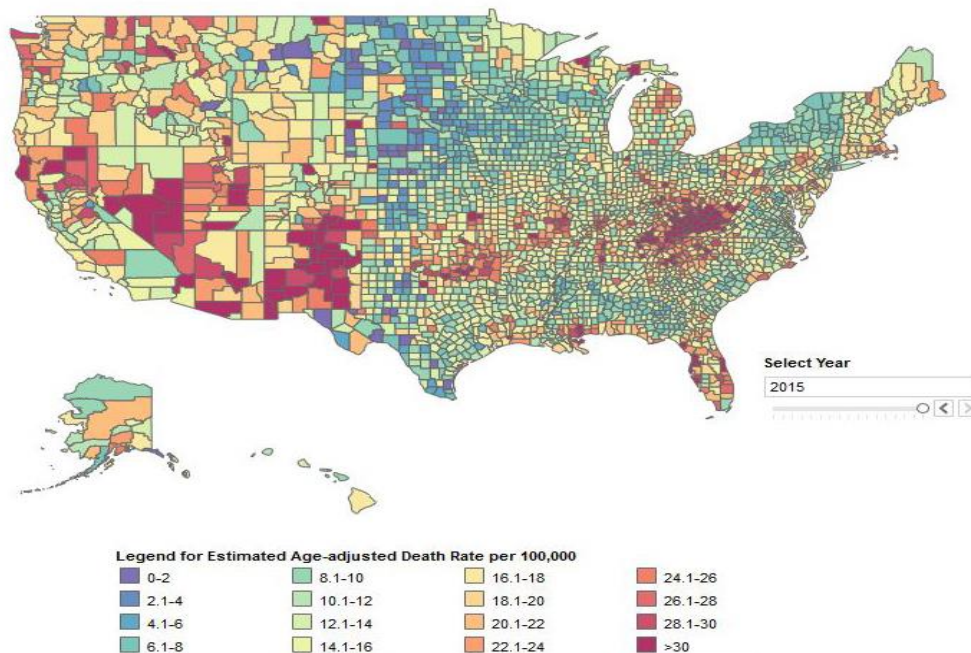
Stress and depression caused mainly by social factors have led some to abuse alcohol and drugs to the point of self-destruction, incarceration, or death. In the United States, an estimated 88,000 *Homo sapiens* die from alcohol-related causes each year. Worldwide, there were 3,300,000 deaths of *Homo sapiens* which were attributed to alcohol consumption in 2012. (538) Beginning in the late 1990s, United States healthcare providers began widely prescribing opioids to treat chronic pain. This ultimately resulted in a billion-dollar opioid prescription drug market and an opioid drug epidemic which has plagued many parts of the United States. In 2010, there were 38,329 *Homo sapiens* in the United States that died of a drug overdose, and in 2014 this number increased 23% to 47,055. The 10 drugs most frequently involved in overdose deaths were heroin, oxycodone, methadone, morphine, hydrocodone, fentanyl, alprazolam, diazepam, cocaine, and methamphetamine. (356) In the United States, there were 52,898 overdose deaths in 2016, of which 9,945 resulted from synthetic opioids excluding methadone, by 2017 the number of overdoses increased to 64,070 with 20,145 caused from synthetic opioids excluding methadone. (535) There were 197,713 deaths in the United States from prescription opioid overdoses between 2000 and 2016. (620) OxyContin was released into the United States market in 1996, and when prescriptions for the drug peaked in 2012, doctors were writing enough prescriptions for every American adult to have a bottle. Since the peak in 2012 there has been a decline in opioid prescriptions and yet an increase in opioid related overdose deaths. (357) The CDC reported that in 2015 the number of opioids prescribed in the United States was enough for every American to be medicated around the clock for 3 weeks. (399) How can the United States spend more than \$4,000,000,000,000 on the Iraq and Afghanistan wars halfway around the world, while only spending \$2,500,000,000 to help Mexico in fighting the drug war which has claimed more than 100,000 civilians and police? Why doesn't the United States government focus more on this drug war which is happening within the United States and in neighboring Mexico? Would simply legalizing all drugs end the drug war? Could rampant drug use be prevented simply through education and social changes?

Estimated Age-adjusted Death Rates§ for Drug Poisoning
by County, United States: 1999



SOURCE: CDC - Drug Poisoning Mortality in the United States, 1999-2015 - <https://www.cdc.gov/nchs/data-visualization/drug-poisoning-mortality/>

Estimated Age-adjusted Death Rates§ for Drug Poisoning
by County, United States: 2015



SOURCE: CDC - Drug Poisoning Mortality in the United States, 1999-2015 - <https://www.cdc.gov/nchs/data-visualization/drug-poisoning-mortality/>

Why has the FDA and DEA allowed opioids to be prescribed so easily and for so long when there is such a prevalent prescription opioid epidemic with rapidly increasing rates of addiction and overdoses, many of which result in death? How did this fatal prescription opioid epidemic begin? Former DEA deputy assistant administrator Joe Rannazzisi told 60 Minutes that pharmaceutical distributors Cardinal Health, McKesson, and AmerisourceBergen, which control most of the industry, allowed millions of pharmaceutical opioid painkillers to go into what he described as bad pharmacies and doctor offices, which then distributed them to patients that had no legitimate medical need for the drugs. Drug companies then lobbied in Washington D.C. to get the Ensuring Patient Access and Effective Drug Enforcement Act passed, which limited the Drug Enforcement Administration's ability to stop the prescription opioid epidemic. Joe Rannazzisi told 60 minutes,

“Because I think that the drug industry -- the manufacturers, wholesalers, distributors and chain drugstores -- have an influence over Congress that has never been seen before. And these people came in with their influence and their money and got a whole statute changed because they didn't like it.” (619)

Countries with the Highest Rates of Burden of Disease for Mental Illness and Behavioral Related Disorders			
Overall	Depression	Anxiety	Alcohol and Illegal Drug Use
China	India	India	China
India	China	China	India
United States	United States	United States	United States
Russia	Indonesia	Brazil	Russia
Brazil	Brazil	Indonesia	Brazil
SOURCE: World Health Organization – Global Burden Diseases 2002 to 2012 - Health statistics and information systems			

Why do these advanced nations have such high rates of depression, anxiety, and other mental issues? Why do the citizens of these nations choose to consume vast quantities of prescription drugs, illegal drugs, and alcohol as a solution to these problems?

Tobacco

Every year around 5,500,000,000,000 cigarettes are produced worldwide, and between 1950 and 2004 the world produced 94,340,000,000,000 cigarettes. (248) Every year 6,000,000 *Homo sapiens* die as a result of smoking tobacco, and an additional 600,000 *Homo sapiens* die as a result of second-hand smoke. (413) In 2017, an estimated 1,000,000,000 *Homo sapiens* worldwide smoked cigarettes. In the 20th century more than 100,000,000 *Homo sapiens* were killed as a result of tobacco use. (226) Each year during the Epiphany celebrations in the village of Vale de Salgueiro in Portugal, parents encourage their children, some as young as 5, to smoke cigarettes. And while no one is really sure what the centuries old tradition symbolizes or even why they continue it, this victimization of children through forced tobacco use continues. (666) More than 7,000 chemical compounds are created and released into the atmosphere when a cigarette is burned, hundreds of which are toxic, and about 70 that are known to cause cancer. (225) Toxic substances which include arsenic, nicotine, tar, cyanide, and even the radioactive materials: polonium-210 and lead-210. (439) In addition there is not only second-hand smoke which can potentially affect others around the smoker, but also third-hand smoke which is the remnants of these toxic chemicals on surfaces after the second-hand smoke has cleared the air.

E-cigarettes are now the latest trend, and they are often marketed as a safer alternative to traditional cigarettes and even advertised as a method to quit smoking, but they can in fact be just as addictive and deadly as traditional cigarettes as they can potentially contain nicotine, diacetyl and other flavorings, volatile organic compounds, heavy metals such as nickel, tin, and lead along with other cancer-causing chemicals and ultrafine particles that can be inhaled deep into the lungs. (679) How many billions of cigarette butts litter the Earth today? Why does the government even allow a product that is known to kill so many millions of *Homo sapiens* and pollute the Earth so badly? A 2015 World Health Organization report on the environmental and health impacts of tobacco concluded,

"Tobacco growing usually involves substantial use of chemicals – including pesticides, fertilizers and growth regulators.

These chemicals may affect drinking water sources as a result of run-off from tobacco growing areas. Research has also shown that tobacco crops deplete soil nutrients by taking up more nitrogen, phosphorus and potassium than other major crops. This depletion is compounded by topping and de-suckering plants, which increase the nicotine content and leaf yields of tobacco plants.

Land used for subsistence farming in low- and middle-income countries may be diverted to tobacco as a cash crop. Intensive lobbying and investments by multinational tobacco companies (e.g. Philip Morris International, British American Tobacco and Japan Tobacco International) and leaf buyers (e.g. Universal Corporation and Alliance One International) along with market liberalization measures have encouraged the expansion of tobacco agriculture in low- and middle-income countries. Many of these countries have limited legislative and economic capacities to resist multinational tobacco companies' influence and investments. As a consequence of expanded tobacco agriculture, there are short-term economic benefits for some farmers, but there will be long-term social, economic, health and environmental detriments for many others.

Due to widespread concerns about unfair labour practices in tobacco agriculture, tobacco control advocates have recently been working with tobacco farmers and farm workers to ensure the right to collective bargaining and to receive living wages and fair leaf prices.⁵ Given the agricultural labour practices in both low- and middle-income countries and more developed countries, attention is also needed to ensure the safety of children involved in tobacco farming. Farm workers, especially child labourers, minorities and migrant workers are at risk of nicotine toxicity (green tobacco illness), caused by handling tobacco leaves without protection during harvest and processing.

In 1995, it was estimated that global tobacco manufacturing produced over 2,000,000 tonnes of solid waste, 300,000 tonnes of non-recyclable nicotine-containing waste and 200,000 tonnes of chemical waste. If annual cigarette production had remained constant for the past 20 years (output has actually increased from 5 to 6.3 trillion cigarettes annually), tobacco factories would have deposited a total of 45,000,000 tonnes of solid wastes, 6,000,000 tonnes of nicotine waste and almost 4,000,000 tonnes of chemical wastes during this time. Other toxic by-products of tobacco manufacturing or chemicals used in manufacturing include ammonia, hydrochloric acid, toluene and methyl ethyl ketone.

The health impacts of environmental tobacco smoke exposure include lung cancer, cardiovascular disease and pulmonary disease. Exposure to residual chemicals in environments where smoking has taken place may also have human health impacts, though these impacts have not yet been quantified. Most cigarettes are lit using matches or gas-filled lighters. If, for example, one wooden match is used to light two cigarettes, the six trillion cigarettes smoked globally each year would require the destruction of about nine million trees to produce three trillion matches. There are also environmental impacts of manufacturing and disposing of the plastic, metal and butane used in making cigarette lighters.

Cigarettes remain an important cause of accidental fires and resulting deaths. In the United Kingdom of Great Britain and Northern Ireland, cigarettes caused 7% of fires in 2013–2014, making them the single most important cause of deaths related to fires (34 deaths/1,000 fires).¹¹ In the United States of America, cigarettes have been responsible for 8–10% of all fires over the past 10 years (on average 90,000 fires per year); they also remain the single most important cause of deaths related to fires (540 of 2855 total deaths in 2011). These fires were responsible for 621 million United States dollars in direct property damage and 1,640 civilian injuries. Regulations requiring cigarettes to self-extinguish in Canada and the USA were associated with a 30% decline in fire-related deaths from 2003 to 2011.

Cigarette butts are the most commonly discarded piece of waste globally and are the most frequent item of litter picked up on beaches and water edges worldwide.¹⁴ The non-biodegradable cellulose acetate filter attached to most manufactured cigarettes is the main component of cigarette butt waste and trillions of filter-tipped butts are discarded annually. Assuming that each filter weighs 170 milligrams, the weight of all tobacco-attributable non-biodegradable (filter) waste discarded annually is about 175,200 tonnes.

Hazardous substances have been identified in cigarette butts – including arsenic, lead, nicotine and ethyl phenol. These substances are leached from discarded butts into aquatic environments and soil. Although the environmental impact of this waste has not yet been quantified, the large quantity of discarded butts may allow leachates to affect the quality of drinking water. Other post-consumption wastes, such as medicines, pesticides and plastic microbeads from cosmetics, have been found in drinking water sources. It is possible that tobacco product waste may also prove to be a significant environmental contaminant and potential human health hazard through bioaccumulation in the food-chain.

With 6 trillion cigarettes manufactured annually, about 300 billion packages (assuming 20 cigarettes per pack) are made for tobacco products. Assuming each empty pack weighs about six grams, this amounts to about 1,800,000 tonnes of packaging waste, composed of paper, ink, cellophane, foil and glue. The waste from cartons and boxes used for distribution and packing brings the total annual solid post-consumption waste to at least 2,000,000 tonnes. This compares with an estimated 1,830,000 tonnes annually of plastic waste from mineral water bottles (estimation method available from the corresponding author).

Electronic cigarettes may contain batteries that require special disposal as well as chemicals, packaging and other non-biodegradable materials. The US Federal Emergency Management Agency (FEMA) has expressed concerns about the flammability and lack of product regulation of electronic cigarettes and their components.

Tobacco smoking leads directly to the emission of 2,600,000 tonnes of carbon dioxide and about 5,200,000 tonnes of methane. Data from 66 low- and middle-income countries showed that tobacco growing and curing caused significant deforestation between 1990 and 1995, amounting to approximately 2,000 hectares – on average, 5% of each country's estimated deforestation during that five-year period. Worldwide, approximately 13,000,000 hectares of forest are lost due to agriculture or natural causes each year, and of this, at least 200,000 hectares are for tobacco agriculture and curing.¹ Deforestation is the second largest anthropogenic source of carbon dioxide to the atmosphere (approximately 20%), after fossil fuel combustion. One estimate of the impact of deforestation in tobacco agriculture and curing is that it causes almost 5% of global greenhouse gas production.

Despite their now well-known efforts to sow doubt among the public and policy-makers about anthropogenic climate change, tobacco companies have advertised their efforts to reduce carbon emissions. British American Tobacco estimated in 2006 that production of one million cigarettes produces 0.79 tonnes of carbon dioxide. According to this estimate, 4,740,000 tonnes of carbon dioxide would be emitted annually by global cigarette manufacturing. Other analyses assert that this is a gross underestimate of the greenhouse gas burden due to tobacco growing, manufacturing and transport.²³ No estimates are as yet available on the extent of carbon dioxide emissions due to tobacco product transport." (438)

Major Medical Outbreaks

There are thousands of diseases on Earth which can affect *Homo sapiens* with only 26 available vaccines and another 24 vaccines in the pipeline being developed. (250) And although Polio will most likely be eradicated soon, as of 2017 smallpox was the only human infectious disease to have been completely eradicated. Does this not prove the resilience and evolutionary brilliance with which nature works, and how little *Homo sapiens* actually understand about nature? The XDR (extensively drug resistant) typhoid outbreak in Pakistan which began in November 2016 and other pathogens which have developed resistance to antibiotics or vaccines are also evidence of this as well.

Modern medicine and lifestyle changes have halted the spread of some diseases and prevented a mass pandemic for nearly 100 years, but *Homo sapiens* activities have led to the emergence of zoonotic human pathogens including viruses, bacteria, protozoa, and rickettsia in addition to the spread of vector borne diseases. When the first large cities were beginning, diseases were rampant until chlorinated water and the introduction of sewers, but even today cities are breeding grounds for diseases. Modern medicine, science, and government import/export regulations have thus far prevented the spread of a major outbreak like Black Death, but could a new pathogen emerge that medicine and science cannot fight? Why have so many of these recent outbreaks originated from livestock operations and animal consumption? If these faunae were not being consumed in such mass quantities, could many of these outbreaks have been avoided?

Major Medical Outbreaks in Recent History Involving Fauna and <i>Homo sapiens</i>	
1964 Aberdeen typhoid outbreak	The 1967 United Kingdom foot-and-mouth outbreak was a major outbreak of foot and mouth disease in the United Kingdom. The In 1964 there was an outbreak of typhoid in the city of Aberdeen, Scotland. The first two cases were identified on 20 May 1964; eventually over 400 cases were diagnosed and the patients were quarantined at the City Hospital in Urquhart Road, but no fatalities resulted. Dr Ian MacQueen, the Medical Officer of Health for Aberdeen, became well known in the media for his twice-daily briefings. The outbreak was eventually traced to contaminated tinned corned beef from South America made by Fray Bentos and sold in the city's branch of the Scottish grocery chain William Low.
Chronic wasting disease (CWD) 1967	<p>The origin and mode of transmission of the prions causing Chronic wasting disease (CWD) is unknown, but recent research indicates that prions can be excreted by deer and elk, and are transmitted by eating grass growing in contaminated soil. Animals born in captivity and those born in the wild have been affected with the disease. Based on epidemiology, transmission of CWD is thought to be lateral (from animal to animal). Maternal transmission may occur, although it appears to be relatively unimportant in maintaining epidemics. An infected deer's saliva is able to spread the CWD prions. Exposure between animals is associated with sharing food and water sources contaminated with CWD prions shed by diseased deer.</p> <p>The disease was first identified in 1967 in a closed herd of captive mule deer in contiguous portions of northeastern Colorado. In 1980, the disease was determined to be a TSE. It was first identified in wild elk and mules in 1981 in Colorado and Wyoming, and in farmed elk in 1997. In May 2001, CWD was also found in free-ranging deer in the southwestern corner of Nebraska (adjacent to Colorado and Wyoming) and later in additional areas in western Nebraska. The limited area of northern Colorado, southern Wyoming, and western Nebraska in which free-ranging deer, moose,</p>

	<p>and/or elk positive for CWD have been found is referred to as the endemic area. The area in 2006 has expanded to six states, including parts of eastern Utah, southwestern South Dakota, and northwestern Kansas. Also, areas not contiguous (to the endemic area) areas in central Utah and central Nebraska have been found. The limits of the affected areas are not well defined, since the disease is at a low incidence and the amount of sampling may not be adequate to detect it. In 2002, CWD was detected in wild deer in south-central Wisconsin and northern Illinois and in an isolated area of southern New Mexico. In 2005, it was found in wild white-tailed deer in New York and in Hampshire County, West Virginia. In 2008, the first confirmed case of CWD in Michigan was discovered in an infected deer on an enclosed deer-breeding facility. It is also found in the Canadian provinces of Alberta and Saskatchewan. In February 2011, the Maryland Department of Natural Resources reported the first confirmed case of the disease in that state. The affected animal was a white-tailed deer killed by a hunter.</p> <p>CWD has also been diagnosed in farmed elk and deer herds in a number of states and in two Canadian provinces. The first positive farmed elk herd in the United States was detected in 1997 in South Dakota. Since then, additional positive elk herds and farmed white-tailed deer herds have been found in South Dakota (7), Nebraska (4), Colorado (10), Oklahoma (1), Kansas (1), Minnesota (3), Montana (1), Wisconsin (6) and New York (2). As of fall of 2006, four positive elk herds in Colorado and a positive white-tailed deer herd in Wisconsin remain under state quarantine. All of the other herds have been depopulated or have been slaughtered and tested, and the quarantine has been lifted from one herd that underwent rigorous surveillance with no further evidence of disease. CWD also has been found in farmed elk in the Canadian provinces of Saskatchewan and Alberta. A retrospective study also showed mule deer exported from Denver to the Toronto Zoo in the 1980s were affected. In June 2015, the disease was detected in a male white-tailed deer on a breeding ranch in Medina County, Texas. State officials euthanized 34 deer in an effort to contain a possible outbreak.</p> <p>Species that have been affected with CWD include elk, mule deer, white-tailed deer, black-tailed deer, and moose. Other ruminant species, including wild ruminants and domestic cattle, sheep, and goats, have been housed in wildlife facilities in direct or indirect contact with CWD-affected deer and elk, with no evidence of disease transmission. However, experimental transmission of CWD into other ruminants by intracranial inoculation does result in disease, suggesting only a weak molecular species barrier exists. Research is ongoing to further explore the possibility of transmission of CWD to other species. By April 2016 CWD had been found in captive animals in South Korea; the disease arrived there with live elk that were imported for farming in the late 1990s.</p> <p>In 2016, the first case of CWD in Europe was from the Nordfjella free ranging reindeer in Southern Norway. Scientists surveyed the diseased female reindeer until the reindeer died and used the carcass to isolate the prions. The main origin of CWD to Norway is still unknown, whereas importation of infected deer was the contamination source in South Korea. Norway has strict legislation and rules not allowing importation of live animals and cervids into the country. Norway has had a scrapie surveillance program since 1997; while no reports of scrapie within the range of Nordfjella reindeer sup population have been identified, sheep are herded through that region and are a potential source of infection. In each of May and June, infected wild moose were found around 300 km north from the first case, in Selbu. By the end of August, a fourth case had been confirmed in a wild reindeer shot in the same area as the first case in March. In 2017, the Environment Agency of the Norwegian government released guidelines for hunters hunting reindeer in the Nordfjella areas. The guidelines contain information on identifying animals with CWD symptoms, instructions for minimizing the risk of contamination, as well as a list of supplies given to hunters to be used for taking and submitting samples from shot reindeer.</p>
1967 United Kingdom foot-and-mouth outbreak	Over the course of six months, 430,000 animals across 2300 farms were slaughtered. The average number of animals that were slaughtered in each confirmed case was around 200. The 1967 crisis saw the last reported case of human foot-and-mouth disease. The victim was a farm-worker who was believed to have contracted the virus by consuming contaminated milk. The disease was not life-threatening and they were able to recover within several weeks.
1968 H3N2 outbreak AKA 'Hong Kong Flu'	The 1968 flu pandemic was a category 2 flu pandemic whose outbreak in 1968 and 1969 killed an estimated 1,000,000 people worldwide. Both the H2N2 and H3N2 pandemic flu strains contained genes from avian influenza viruses. The new subtypes arose in pigs coinfecting with avian and human viruses and were soon transferred to humans. Swine were considered the original "intermediate host" for influenza, because they supported reassortment of divergent subtypes. However, other hosts appear capable of similar coinfection (e.g., many poultry species), and direct transmission of avian viruses to humans is possible.
1976 Swine flu outbreak	The 1976 swine flu outbreak, also known as the swine flu fiasco, or the swine flu debacle, was a strain of H1N1 influenza virus that appeared in 1976. Infectious morbidity was only detected from

	January 19 to February 9, and were not found outside Fort Dix. The outbreak is most remembered for the mass immunization that it prompted in the United States. The strain itself killed one person and hospitalized 13. However, side-effects from the vaccine are thought to have caused five hundred cases of Guillain-Barré syndrome and 25 deaths.
1984 Rabbit haemorrhagic disease outbreak	Rabbit haemorrhagic disease (RHD), also known as rabbit calicivirus disease (RCD) or viral haemorrhagic disease (VHD), is a highly infectious and often fatal disease that affects wild and domestic rabbits of the species <i>Oryctolagus cuniculus</i> . The infectious agent responsible for the disease is rabbit haemorrhagic disease virus (RHDV), or rabbit calicivirus (RCV), genus <i>Lagovirus</i> of the family <i>Caliciviridae</i> . The virus infects only rabbits, and has been used in some countries to control rabbit populations. RHD first appeared in the Winter of 1983 in Jiangsu Province of the People's Republic of China. It was first isolated and characterized by S.J. Liu et al. in 1984. The Chinese outbreak was spread by the angora rabbit, which had originated in Europe. Fourteen million domesticated rabbits died within nine months in the outbreak. In 1984 the virus that caused the disease was identified. The virus spread westward and reached Europe in 1988. The virus has since appeared in Mexico, Cuba, Australia, New Zealand and the United States. In 1992, the United Kingdom reported its first case of RHD in domestic show rabbits. By the late 1990s, RHD stretched to forty countries and had become endemic in wild and feral rabbit populations in Europe, Australia, New Zealand and Cuba. In Europe, there was a rapid increase in research into RHD, due to the importance of the commercial breeding of rabbits for meat and fur production. The first reported case in the United States was in Iowa on March 9, 2000. The affected breeds included Palominos and California Whites. By April 6, 25 of the 27 affected rabbits had died of the infection. In order to contain the disease, the remaining two rabbits were euthanized. No new introductions of rabbits were placed on the farm for two years after the discovery of RHD and August 1999 was the last time rabbits left and/or returned to the farm. The United States experienced other outbreaks of RHD in 2001 (Utah, Illinois, New York) and 2005 (Indiana). In 2010, a new virus variant called rabbit hemorrhagic disease virus 2 (RHDV2) emerged in France
1985 California listeria outbreak	The 1985 California listeria outbreak was in Mexican style soft cheese made by Jalisco in California. There were 52 confirmed deaths, including 19 stillbirths and 10 infant deaths.
1985 United States salmonellosis outbreak	The 1985 United States salmonellosis outbreak was <i>Salmonella typhimurium</i> in milk from the Hillfarm Dairy in Melrose Park, Illinois. Two people died and the infection was a contributing factor in the deaths of "four, possibly five, others".
1998 United States listeriosis outbreak	The 1998 United States listeriosis outbreak was the third deadliest outbreak of foodborne illness in the United States since the Centers for Disease Control and Prevention started tracking in the 1970s. There were 14 deaths and 4 miscarriages or stillbirths in a listeria outbreak in hot dogs and cold cuts from Sara Lee Corporation. Some sources put the death toll as high as 21.
1993 Jack in the Box E. coli outbreak	Health inspectors traced the contamination to the restaurants' "Monster Burger" sandwich which had been on a special promotion (using the slogan So good it's scary!) and sold at a discounted price. The ensuing high demand "overwhelmed" the restaurants and the product was not cooked for long enough or at a high enough temperature to kill the bacteria. At a 1993 press conference the president of Foodmaker (the parent company of Jack in the Box) blamed Vons Companies Inc. (supplier of their hamburger meat) for the E. coli epidemic. However, the Jack in the Box fast-food chain knew about but disregarded Washington state laws which required burgers to be cooked to 155 °F (68 °C), the temperature necessary to completely kill E. coli. Instead, it adhered to the federal standard of 140 °F (60 °C). Had Jack in the Box followed the state cooking standard, the E. coli outbreak would have been prevented.
1999 Nipah virus outbreak	<p>Nipah virus was identified in April 1999, when it caused an outbreak of neurological and respiratory disease on pig farms in peninsular Malaysia, resulting in 257 human cases, including 105 human deaths and the culling of one million pigs. In Singapore, 11 cases, including one death, occurred in abattoir workers exposed to pigs imported from the affected Malaysian farms. The Nipah virus has been classified by the Centers for Disease Control and Prevention as a Category C agent. The name "Nipah" refers to the place, Kampung Baru Sungai Nipah in Port Dickson, Negeri Sembilan, the source of the human case from which Nipah virus was first isolated. Nipah virus is one of several viruses identified by WHO as a likely cause of a future epidemic in a new plan developed after the Ebola epidemic for urgent research and development before and during an epidemic toward new diagnostic tests, vaccines and medicines.</p> <p>The outbreak was originally mistaken for Japanese encephalitis (JE), however, physicians in the area noted that persons who had been vaccinated against JE were not protected, and the number of cases among adults was unusual. Despite the fact that these observations were recorded in the first month of the outbreak, the Ministry of Health failed to react accordingly, and instead launched a nationwide campaign to educate people on the dangers of JE and its vector, <i>Culex</i> mosquitoes.</p> <p>Symptoms of infection from the Malaysian outbreak were primarily encephalitic in humans and respiratory in pigs. Later outbreaks have caused respiratory illness in humans, increasing the likelihood of human-to-human transmission and indicating the existence of more dangerous strains</p>

	<p>of the virus. Based on seroprevalence data and virus isolations, the primary reservoir for Nipah virus was identified as Pteropid fruit bats, including <i>Pteropus vampyrus</i> (Large Flying Fox), and <i>Pteropus hypomelanus</i> (Small flying fox), both of which occur in Malaysia.</p> <p>The transmission of Nipah virus from flying foxes to pigs is thought to be due to an increasing overlap between bat habitats and piggeries in peninsular Malaysia. At the index farm, fruit orchards were in close proximity to the piggery, allowing the spillage of urine, faeces and partially eaten fruit onto the pigs. Retrospective studies demonstrate that viral spillover into pigs may have been occurring in Malaysia since 1996 without detection. During 1998, viral spread was aided by the transfer of infected pigs to other farms, where new outbreaks occurred.</p>
2000 Walkerton E. coli outbreak	The water supply, drawn from groundwater, became contaminated with the highly dangerous O157:H7 strain of E. coli bacteria. This contamination was due to farm runoff into an adjacent water well that had been known for years to be vulnerable to groundwater contamination. The five people died directly from drinking the E. coli-contaminated water and about 2,500 became ill.
2001 United Kingdom foot-and-mouth outbreak	The outbreak of foot-and-mouth disease in the United Kingdom in 2001 caused a crisis in British agriculture and tourism. This epizootic saw 2,000 cases of the disease in farms across most of the British countryside. Over 10 million sheep and cattle were killed in an eventually successful attempt to halt the disease.
2002-2003 SARS outbreak	A SARS outbreak occurred between November 2002 and July 2003. SARS is a relatively rare disease, with 8,273 cases as of 2003. In late May 2003, studies from samples of wild animals sold as food in the local market in Guangdong, China, found the SARS coronavirus could be isolated from masked palm civets (<i>Paguma sp.</i>), but the animals did not always show clinical signs. The preliminary conclusion was the SARS virus crossed the xenographic barrier from palm civet to humans, and more than 10,000 masked palm civets were killed in Guangdong Province. Virus was also later found in raccoon dogs (<i>Nyctereuteus sp.</i>), ferret badgers (<i>Melogale spp.</i>), and domestic cats. In 2005, two studies identified a number of SARS-like coronaviruses in Chinese bats. Phylogenetic analysis of these viruses indicated a high probability that SARS coronavirus originated in bats and spread to humans either directly or through animals held in Chinese markets.
2003 U.S. Midwest monkeypox outbreak	The 2003 Midwest monkeypox outbreak marked the first time monkeypox infection has appeared in the United States, and the first time in the Western Hemisphere. Beginning in May, 2003 a total of 71 cases of human monkeypox were found in five Midwestern states including Wisconsin (39 cases), Indiana (16), Illinois (12), Kansas (1), Missouri (2) and Ohio (1). The cause of the outbreak was traced to Gambian rats imported into the United States by an exotic animal importer in Texas.
2003 H5N1 outbreak	By midyear of 2003 outbreaks of poultry disease caused by H5N1 occurred in Asia, but were not recognized as such. That December animals in a Thai zoo died after eating infected chicken carcasses. Later that month H5N1 infection was detected in 3 flocks in the Republic of Korea. H5N1 in China in this and later periods is less than fully reported. Blogs have described many discrepancies between official China government announcements concerning H5N1 and what people in China see with their own eyes. Many reports of total H5N1 cases exclude China due to widespread disbelief in China's official numbers.
2004 H5N1 outbreak	In January 2004 a major new outbreak of H5N1 surfaced in Vietnam and Thailand's poultry industry, and within weeks spread to ten countries and regions in Asia, including Indonesia, South Korea, Japan and China. In October 2004 researchers discovered H5N1 is far more dangerous than previously believed because waterfowl, especially ducks, were directly spreading the highly pathogenic strain of H5N1 to chickens, crows, pigeons, and other birds and that it was increasing its ability to infect mammals as well. From this point on, avian influenza experts increasingly refer to containment as a strategy that can delay but not prevent a future avian flu pandemic.
2005 South Wales E. coli O157 outbreak	It was the largest outbreak of E. coli O157 in Wales and the second largest in the UK. 157 cases were identified in the outbreak; 31 people were hospitalized, and one child, 5-year old Mason Jones, died. Most of the 157 cases identified were children, attending 44 different schools across four different local authorities – Bridgend, Methry Tydfil, Caerphilly and Rhondda Cynon Taf. Of those infected, 109 cases were identified as a strain of E. coli O157 unique to this outbreak. The cause was a vacuum packing machine used to package both raw meat and cooked meat without being properly cleaned between batches resulting in cross-contamination.
2005 H5N1 outbreak	In January 2005 an outbreak of avian influenza affected thirty three out of sixty four cities and provinces in Vietnam, leading to the forced killing of nearly 1.2 million poultry. Up to 140 million birds are believed to have died or been killed because of the outbreak. In April 2005 there begins an unprecedented die-off of over 6,000 migratory birds at Qinghai Lake in central China over three months. This strain of H5N1 is the same strain as is spread west by migratory birds over at least the next ten months. In August 2005 H5N1 spread to Kazakhstan, Mongolia and Russia. On September 29, 2005, David Nabarro, the newly appointed Senior United Nations System Coordinator for Avian and Human Influenza, warned the world that an outbreak of avian influenza could kill 5 to 150 million people. David Nabarro later stated that as the virus had spread to migratory birds, an outbreak could start in Africa or the Middle East. Later in 2005 H5N1 spread to Turkey, Romania, Croatia and Kuwait.

2006 H5N1 outbreak	In the first two months of 2006 H5N1 spread to other Asian countries (such as India), north Africa, and Europe in wild bird populations possibly signaling the beginning of H5N1 being endemic in wild migratory bird populations on multiple continents for decades, permanently changing the way poultry are farmed. In July and August 2006 significantly increased numbers of bird deaths due to H5N1 were recorded in Cambodia, China, Laos, Nigeria, and Thailand while continuing unabated at a rate unparalleled in Indonesia. In June, there was a human outbreak in Indonesia when 8 members of a family in Sumatra became infected and 7 died. The WHO reported that this may have been the first recorded instance of human-to-human transmission. In September, Egypt and Sudan joined the list of nations seeing a resurgence of bird deaths due to H5N1. In November and December, South Korea and Vietnam joined the list of nations seeing a resurgence of bird deaths due to H5N1. The first reports of bird flu in India came from the village of Navapur in the Nandurbar district of Maharashtra on 19 February 2006. Villagers reported a large number of bird deaths in the village. Soon after the presence of the virus was confirmed culling operations began. 253000 birds and 587000 eggs were destroyed within 5 days.
2006 North American E. coli O157:H7 outbreak	A follow-up report by the CDC and a joint report by the California Department of Health Services (CDHS) and U.S. FDA concluded that the probable source of the outbreak was Paicines Ranch, an Angus cattle ranch that had leased land to spinach grower Mission Organics. The report found 26 samples of E. coli "indistinguishable from the outbreak strain" in water and cattle manure on the San Benito County ranch, some within a mile from the tainted spinach fields. Although officials could not definitively say how the spinach became contaminated, both reports named the presence of wild pigs on the ranch and the proximity of surface waterways to irrigation wells as "potential environmental risk factors."
2007 H5N1 outbreak	In January, Japan, Hungary, Russia, and the United Kingdom joined the list of nations seeing a resurgence of bird deaths due to H5N1. In February, Pakistan, Turkey, Afghanistan, and Myanmar joined the list and Kuwait saw its first major outbreak of H5N1 avian influenza. In March Bangladesh and Saudi Arabia each saw their first major outbreak of H5N1 avian influenza and Ghana in May. As H5N1 continued killing many birds and a few people throughout the spring in countries where it is now endemic, in June Malaysia and Germany saw a resurgence of bird deaths due to H5N1, while the Czech Republic and Togo experienced their first major outbreak of H5N1 avian influenza. In July France and India also saw a resurgence of bird deaths due to H5N1.
2007 Central Luzon hog cholera outbreak	An outbreak of classical swine fever (hog cholera) in the Philippine region of Central Luzon, particularly the provinces of Pampanga and Bulacan occurred in mid-2007, the Philippine Department of Agriculture (DA) confirmed. The outbreak was originally confined on early July to backyard farms in 3 towns but expanded to 43 barangays in 12 municipalities (of 21 municipalities and 3 cities) in Bulacan. Commercial farms, which are 80% of the farms, were unaffected, according to provincial veterinarian Felipe Bartolome. Bartolome also dismissed the cases of foot-and-mouth disease in the province, and the hog cholera only affected about 3,000–5,000 sows.
2008 H5N1 outbreak	Hong Kong found the H5N1 bird flu virus at a poultry stall in Sham Shui Po. 2,700 birds were ordered to be killed by the local government. A new regulation requires all live chickens not sold by 8pm to be killed. The chairman of the Hong Kong Poultry Wholesalers Association said the government's decision makes it very difficult for their business to continue. Retailers who keep live poultry after 8pm are now subject to a fine of HK\$50,000 and six months imprisonment.
2009 Flu Pandemic H1N1/09 virus	The 2009 flu pandemic or swine flu was an influenza pandemic, and the second of the two pandemics involving H1N1 influenza virus (the first of them being the 1918 flu pandemic), albeit in a new version. However, by 2012, research showed that as many as 579,000 people could have been killed by the disease, as only those fatalities confirmed by laboratory testing were included in the original number, and meant that many of those without access to health facilities went uncounted. The majority of these deaths occurred in Africa and Southeast Asia. Experts, including the WHO, have agreed that an estimated 284,500 people were killed by the disease, much higher than the initial death toll. On June 23, 2009, The New York Times reported that U.S. federal agriculture officials, "contrary to the popular assumption that the new swine flu pandemic arose on factory farms in Mexico," now believe that it "most likely emerged in pigs in Asia, but then traveled to North America in a human." They emphasized that there was no way to prove their hypothesis, but stated that there is no evidence that this new virus, which combines Eurasian and North American genes, has ever circulated in North American pigs, "while there is tantalizing evidence that a closely related 'sister virus' has circulated in Asia."
2009 H5N1 outbreak	H5N1 hits Nepal for first time. In a January 16 report to the World Organization for Animal Health (OIE), government officials in Nepal said the virus struck backyard poultry in a village in Jhapa district in the southeastern corner of Nepal. Though the Nepal Government announced that bird flu in the country's Kankarbhitta area is under control, avian virus surfaced again in Sharanamati of Jhapa district. Over 150 chickens died in the Indian border town, 35 km southwest of Kankarbhitta. The Ministry of Agriculture and Cooperatives declared the area surrounding Sharanamati a "bird-flu affected area" and increased surveillance along the border. A Rapid Response Team (RRT) was dispatched to control the virus. The government also banned the transportation of poultry products throughout the country. The first outbreak was confirmed in Kankarbhitta on January 16. 28,000

	chickens were killed in the area to control the virus
2010 Japan foot-and-mouth outbreak	The Japan foot-and-mouth outbreak was a foot-and-mouth disease (FMD) outbreak that occurred in 2010, in Miyazaki Prefecture, affecting cattle, swine, sheep and goats and taking place ten years after a similar outbreak in 2000. On August 26, Miyazaki governor Higashikokubaru announced that the Foot-Mouth disease was eradicated. It took lives of about 290,000 cattle.
2010-2012 South Korea foot-and-mouth outbreak	A serious outbreak of foot-and-mouth disease occurred in South Korea in 2010–2011, leading to the culling of hundreds of thousands of pigs (as of January 2011) in an effort to contain it. The outbreak began in November 2010 in pig farms in Andong, Gyeongsangbuk-do, and has since spread in the country rapidly. More than 100 cases of foot-and-mouth disease have been confirmed in the country so far, and South Korean officials have started a mass cull of approximately 12 percent of the entire domestic pig population and 107,000 of three million cattle of the country to halt the outbreak. As parts of the culling process, it was reported by some sections of the English-language media that the South Korean government had decided to bury approximately 1.4 million pigs alive, which drew complaints from animal activists
2013 Porcine epidemic diarrhea virus outbreak	<p>Porcine epidemic diarrhea virus (PED virus or PEDV) is a coronavirus that infects the cells lining the small intestine of a pig, causing porcine epidemic diarrhoea, a condition of severe diarrhea and dehydration. Older hogs mostly get sick and lose weight after being infected, where as newborn piglets usually die within five days of contracting the virus. PEDV cannot be transmitted to humans, nor contaminate the human food supply.</p> <p>It was first discovered in Europe, but has become increasingly problematic in Asian countries, such as Korea, China, Japan, the Philippines, and Thailand. It has also spread to North America: In May 2013, the virus was found in 27 U.S. states and eventually killed 6,000,000 piglets in less than a year, then it was discovered in Canada in the winter of 2014. In January 2014, a new variant strain of PEDV with three deletions, one insertion, and several mutations in S (spike) 1 region was identified in Ohio by the Animal Disease Diagnostic Lab of Ohio Department of Agriculture.</p>
2012-2014 Middle East respiratory syndrome coronavirus (MERS-CoV) or EMC/2012 outbreak	Over 1,600 cases of MERS have been reported by 2015 and the case fatality rate is >30%. As of July 2015, MERS-CoV cases have been reported in over 21 countries, including Saudi Arabia, Jordan, Qatar, Egypt, the United Arab Emirates, Kuwait, Turkey, Oman, Algeria, Bangladesh, Indonesia (none were confirmed), Austria, the United Kingdom, South Korea, the United States, Mainland China, Thailand, and the Philippines. At least one person who has fallen sick with MERS was known to have come into contact with camels or recently drank camel milk. Countries like Saudi Arabia and the United Arab Emirates produce and consume large amounts of camel meat. The possibility exists that African or Australian bats harbor the virus and transmit it to camels. Imported camels from these regions might have carried the virus to the Middle East.
2015 Indian swine flu outbreak	2015 Indian swine flu outbreak refers to an outbreak of the 2009 pandemic H1N1 virus in India, which is still ongoing as of March 2015. The states of Gujarat and Rajasthan are the worst affected. India had reported 937 cases and 218 deaths from swine flu in the year 2014. By mid-February 2015, the reported cases and deaths in 2015 had surpassed the previous numbers. The H1N1 virus outbreak had previously occurred India during the 2009 flu pandemic. The virus killed 981 people in 2009 and 1,763 in 2010. The mortality decreased in 2011 to 75. It claimed 405 lives in 2012 and 699 lives in 2013. In 2014, a total of 218 people died from the H1N1 flu, India recorded 837 laboratory confirmed cases in the year. Every year, there was a rise in number of cases and deaths during winter as temperature affects virus. During 2014–15 winter, there was a spurt in cases at the end 2014. In 2015, the outbreak became widespread through India. On 12 February 2015, Rajasthan declared an epidemic. The total number of laboratory confirmed cases crossed 33,000 mark with death of more than 2,000 people.
2015 United States H5N2 outbreak	In 2015, an outbreak of avian influenza subtype H5N2 was identified in a series of chicken and turkey farming operations in the Midwestern region of the United States. As of May 30, more than 43,000,000 birds in 15 states had been destroyed as a result of the outbreak, including nearly 30,000,000 in Iowa alone, the nation's largest egg producer. When an infection is confirmed, all birds at the affected farm are destroyed per USDA guidelines. The birds are culled by pumping an expanding water-based foam into the barn houses, which suffocates them within minutes. The birds are then composted, usually at the location.
2018 salmonella egg recall	The 2018 US egg recall was a product recall for fresh chicken eggs in the United States beginning on April 13, 2018. The United States Department of Agriculture recalled more than 200 million eggs after a salmonella outbreak connected to Iowa egg farms, including Rose Acre Farms. It is the largest egg recall since 2010.
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Over the last 100 years new bacteria and viruses have emerged causing a host of new diseases, Rift Valley fever (early 1900s), Chagas disease (1909), West Nile virus (1937), Zika virus (1947), Lassa fever (1950s), Chikungunya virus (1955), H2N2 Asian flu (1957), Monkeypox (1958), Usutu virus (1959), Enterovirus 68

(1962), Marburg virus (1967), H3N2 Hong Kong flu (1968), Norovirus, (1972), Ebola virus (1976), AIDS virus (1981), BSE bovine spongiform encephalopathy aka Mad Cow Disease (1986), H5N1 avian flu (1997), Nipah virus (1998), SARS coronavirus (2003), H10N7 virus (2004), H1N1 swine flu (2009), MERS virus (2012), H7N9 virus (2013), and others. Viruses can only survive inside a living host unlike bacteria which live on most all surfaces. This means that these viruses have most likely been on Earth for millions of years in other fauna species awaiting exposure to *Homo sapiens*. Could there be an emergence of past diseases like the 1576 Cocoliztli epidemic which killed 15,000,000 or more? Could some of these new diseases be a result of anthropogenic actions like deforestation, which disturb remote habitats and possibly expose these never before documented pathogens? Could the mass consumption of livestock or other flora and fauna exploitation act as future vectors or even incubators for other unknown pathogens? Some of these pathogens have emerged in pigs, chickens, cows, or other livestock, so if fauna consumption ended would these types of pathogens be less likely to emerge? Have shorter winters resulting from global warming contribute to the rapid spreading of the invasive *Aedes aegypti* mosquito, and thus some of these vector-borne diseases? (e.g. West Nile virus, Zika virus, and chikungunya virus spreading so rapidly and infecting so many in the United States) If *Pseudogymnoascus* and anthropogenic activities had not decimated United States bat populations, would the Zika virus have spread so rapidly? Previously unknown viruses frozen in Siberia for more than 30,000 years have been successfully revived, could global warming, mining, or other anthropogenic activities expose other ancient pathogens which lie dormant on Earth? (650) Could one of these viruses only be deadly to modern day *Homo sapiens*, whereas *Homo sapiens* thousands of years ago had a natural immunity?

Older viruses which cause diseases like malaria, smallpox, measles, tuberculosis, etc. have plagued *Homo sapiens* for thousands of years, but appear to have begun flourishing around 10,000 years ago when *Homo sapiens* began practicing agriculture and domesticating faunae. Kristin Harper and George Armelagos remarked that,

“If malaria was contracted by humans in the Pleistocene, it likely would have been in isolated incidences. For example, recent genetic analysis of the glucose-6-phosphate dehydrogenase gene, some variants of which confer resistance to the infection, confirmed that malaria is a recent selective force in human populations, occurring within the last 10,000 years. Based on the mitochondrial genome of the parasite itself, Joy et al. concluded that though the parasite that causes falciparum malaria originated long ago (perhaps 50,000–100,000 YBP), a sudden increase in the population size of the parasite did not occur until around 10,000 years ago when humans began to practice agriculture.

The disease-scape changed dramatically after the adoption of agriculture. New proximity to domestic animals created many opportunities for novel pathogens to infect, and eventually adapt, to humans. It has long been thought that many of our most feared diseases (anthrax, tuberculosis, Q fever, brucellosis, smallpox, measles, etc.) emerged at this time, evolving from progenitors contracted from goats, sheep, cattle, pigs, and fowl. Not all of these origin stories have held up under closer scrutiny. For example, analysis of the *Mycobacterium tuberculosis* genome rules out linear evolution of the human pathogen from *M. bovis*, the species that infects cattle and suggests that the former pathogen may actually have appeared prior to the latter, and not vice-versa. Nevertheless, it is clear that many important human infections did initially arise from close contact with domestic animals. Peri-domestic animals such as rodents and sparrows, which developed permanent habitats in and around human dwellings, could also represent important sources of disease, such as the bubonic plague, hantavirus, typhus, Salmonella, and histoplasmosis.

The very act of farming may have resulted in exposure to novel pathogens as well as increasing the risk of contracting familiar infections. The cultivation of soil, which requires the breaking up of sod, may have exposed farmers to the chiggers that carry the bacterium *Orientia tsutsugamushi*, the causative agent of scrub typhus. Similarly, Livingstone argued that slash-and-burn agriculture in West Africa would have exposed populations to *Anopheles gambiae*, the mosquito that serves as the vector for *Plasmodium falciparum*, the cause of malaria. Slash-and-burn agriculture resulted in sedentary populations surrounded by the pools of sunlit water required for propagation of the Anophelese mosquito. *Aedes aegypti*, the vector that carries yellow and dengue fever, breeds in artificial containers; frequent contact with this mosquito is also likely to have begun and intensified around the time that sedentary settlements became common. Finally, agricultural practices such as irrigation and the use of human feces as fertilizer would have increased exposure to pathogens such as the one that causes schistosomiasis.

Changes in nutrition and food handling would also have altered disease risk. The shift to agriculture resulted in a reduction of the dietary niche, which would have predisposed many individuals to dietary deficiencies uncommon in the Pleistocene. For example, porotic hyperostosis, a skeletal marker indicative of anemia (including that caused by iron-deficiency) first appears in the Upper Paleolithic, increasing throughout the Neolithic. Nutritional deficiencies, which alone were sufficient to cause disease, would also have altered host immune competence, making humans in this time-period more susceptible to infection following contact with a pathogen. Agriculture also resulted in regular food surpluses that had to be stored in large quantities

and widely distributed, which probably resulted in outbreaks of food poisoning.

In sum, Cohen and Armelagos provide a number of case studies that show a decline in health following the Neolithic transformation, suggesting that this period in human history (a period with different start and end points in different areas) could indeed be regarded justifiably as an age of pestilence and famine. The increasing class inequalities, epidemic diseases, and dietary insufficiencies would also have added mental stress to the list of illnesses that plagued agriculturalists.” (401)

Government and Corporate Influence - ‘Whomever Has the Gold Makes the Rules’

Regardless of government type, since the invention of money and commerce there has always been some type of a financial scandal, price gouging, land dispute, outright theft, or other negative influence which has stolen from society as a whole. Today, there is a *‘revolving door’* in nearly every sector of government and industry from defense to agriculture, and it has resulted in the United States becoming a sort of plutocracy with a quid pro quo political process which has also led to corporations, religions, and foreign-connected interests having vast influence and control of certain sectors of government through the use of SuperPACs and lobbyists. As of December 11, 2017, there were 1,692 groups organized as super PACs which reported total receipts of \$108,318,639 in the 2018 cycle. (623) Regulatory capture has become common in many industries with lobbyist spending enormous sums of money to promote this failure of government. In 1998, there were 10,404 registered lobbyists which spent \$1,450,000,000 on lobbying Washington D.C. politicians for a wide range of business sectors, social causes, and other various self-interest groups. By 2016, the amount of money more than doubled with 11,186 registered lobbyists spending \$3,150,000,000. (294) But the real number is estimated to be closer to 100,000 lobbyists spending \$9,000,000,000 as lobbying has now gone underground and out of the spotlight making it less noticeable to the public eye. (293) More than 200 of these groups are affiliated with some religion and they spent \$390,000,000 per year lobbying. (295) Is this not a serious conflict of interest regarding the separation of church and state? The mind maps at www.theyrule.net show just how connected corporate boards and the government are.

Lobbying is protected under the First Amendment of the United States constitution, but should it not be more regulated and have more oversight and transparency to prevent the current level of abuse, obscurity, and manipulation of government regulations? Should not lobbying budgets be more limited? How can the government function reliably for the citizens if corporations are allowed to spend billions of dollars on lobbying and campaign contributions unchecked, which allows them to get laws passed to their benefit for tax breaks, less regulations, and other favors from politicians and government regulators? Why isn’t there a cooling-off period of 36 months or more to prevent the door from revolving? Should not foreign nations be banned from hiring American lobbyists to prevent their attempts to influence the foreign policy of the United States? (e.g. In 2016 Taiwanese officials hired Bob Dole to set up the famous controversial phone call between president-elect Donald Trump and Taiwanese President Tsai Ing-Wen) How can individuals like Dick Cheney, Meredith Attwell Baker, Linda Fisher, and so many others be allowed to serve in government and private sector jobs which have such conflicts of interests? Cannot businesses and interested individuals simply sit down with politicians and discuss what they want to ameliorate, instead of basing reform on money and a system where the highest bidder wins even with the most negative idea? If lobbying with money, other gifts, and other loopholes like Super PACs exist, then doesn’t this mean that government will always be for sale to the highest bidder? If the regulated are allowed to become the regulators, how will the regulatory system ever function properly? How can a democracy work with so much commercial lobbying and influence that leads to so much corruption and lawlessness? How can a government function unbiasedly when government regulators are former corporate employees with active interests in that business sector? How can a government function when it becomes dominated by the corporate industries it is supposed to be regulating?

Perverse subsidies have become more prolific resulting in negative environmental impacts. In 2005, it was estimated that governments around the world spent \$400,000,000,000 a year subsidizing transportation, fishing, energy, agriculture, and water related industries. (221) Why do well established industries, (e.g. oil and gas, pharmaceutical, agricultural, etc.) receive so many subsidies, while new and struggling industries receive little or no subsidies at all? Would these perverse subsidies not be better spent on environmental clean-up, education, conservation, infrastructure, healthcare, or other direct social improvements?

Rampant conflicts of interest have also occurred in recent decades between government regulatory agencies and corporations. These conflicts of interest have affected all sectors of industry, but can be seen especially in the pharmaceutical, food, and energy industries. This influence on regulations, which are supposed to keep industries in check and protect consumers, has been corrupted and led to consumer health and safety issues, while also monopolizing industries even further. How can politics and a justice system ever function properly if money, greed, corporate, or personal interests are able to corrupt these systems? Why is Scott Pruitt, a lawyer with no scientific background, a global warming denier, and someone with known ties to the fossil fuel industry who has fought against the EPA for years allowed to be the Administrator of the Environmental Protection Agency? Why are politicians, lawyers, and businesspersons appointed to these positions when clearly someone with a scientific background would be more beneficial? Richard Hofstadter remarked that,

“The Founding Fathers were sages, scientists, men of broad cultivation, many of them apt in classical learning, who used their wide reading in history, politics, and laws to solve the exigent problems of their time. No subsequent era in our history has produced so many men of knowledge among its political leaders as the age of John Adams, John Dickinson, Benjamin Franklin, Alexander Hamilton, Thomas Jefferson, James Madison, George Mason, James Wilson, and George Wythe. One might have expected that such men, whose political achievements were part of the very fabric of the nation, would have stood as permanent and overwhelming testimonial to the truth that men of learning and intellect need not be bootless and impractical as political leaders.

It is ironic that the United States should have been founded by intellectuals; for throughout most of our political history, the intellectual has been for the most part either an outsider, a servant, or a scapegoat.” (362)

A new generation of politicians are about to come forth far more openminded, educated, and concerned about the conservation of Earth and the well-being of their fellow *Homo sapiens*. And although the old will undoubtedly go kicking and screaming they will ultimately be replaced, and with them their antiquated ideas and systems which did so much destruction to Earth and suppressed so many *Homo sapiens* will also be no more. A psychiatric review of biographical sources regarding mental illness of 37 United States Presidents between 1776 and 1974 found that 18 Presidents met criteria suggesting they had a psychiatric disorder, the most common being depression, anxiety, bipolar disorder, and alcoholism. In 10 of the instances, a psychiatric disorder was clearly evident during the timeframe when the individual held presidential office, and in most cases probably impaired their job performance. (649) If one examines the political leaders of the last 100 years or more, they will find that many of them were either mentally unstable, greedy, corrupt, self-centered, egotistical, racists, or just plain tyrannical who got into power by bullying, lying, cheating, and stealing. They were not true leaders and were not scientific or philosophically minded individuals. Why are these types of *Homo sapiens* elected to office and allowed to corrupt the government so openly and with no real consequences for their actions? What does this say about the public who elects them or allows them to be elected? Are they ignorant? Do they simply not care? Or are the politicians an actual reflection of the voters? One can imagine how brilliant a political leader would be if they were scientifically minded and highly educated using logical thought to make most decisions. If more scientists and other intellectuals were to get involved in politics and held more positions within the government, how would this change the world? Perhaps the public would be better served if the U.S. Senate Appointments Clause also required candidates to take an IQ test, or a combination of other psychological testing to analyze how intelligent and incompetent they truly are, what their moral standards are, and how they would react towards particular situations relating to the job. Albert Einstein wrote,

“Private capital tends to become concentrated in few hands, partly because of competition among the capitalists, and partly because technological development and the increasing division of labor encourage the formation of larger units of production at the expense of the smaller ones. The result of these developments is an oligarchy of private capital the enormous power of which cannot be effectively checked even by a democratically organized political society. This is true since the members of legislative bodies are selected by political parties, largely financed or otherwise influenced by private capitalists who, for all practical purposes, separate the electorate from the legislature. The consequence is that the representatives of the people do not in fact sufficiently protect the interests of the underprivileged sections of the population. Moreover, under existing conditions, private capitalists inevitably control, directly or indirectly, the main sources of information (press, radio, education). It is thus extremely difficult, and indeed in most cases quite impossible, for the individual citizen to come to objective conclusions and to make intelligent use of his political rights.” (65)

A very small percentage of Americans are directly involved in or even aware of their government’s activities,

and those that actually do vote elect a candidate during an election usually based on party affiliation never looking into their government's activities and what legislation is being enacted or changed. A good example of this can be seen at how few comments there are on <https://www.regulations.gov/> many of the proposals have 0 comments. Another example can be seen in how few citizens actually attend the rare, if ever held at all, town hall meetings. The United States presidential voter turnout in 1890 was 80%, by 1907 it had fallen to 65%, and in the 2016 election it was 55.5%. What does this say about society when only around half the population eligible to vote does not participate? Why do so few take part in the democratic political process, while it is supposedly cherished by so many? Are they complacent with their government, or do they simply not care? Have they given up as it seems hopeless and they see no point knowing that their vote can be overridden by the Electoral College like in the 2000 and 2016 presidential elections? How can an electoral college made up of 538 individuals override the choices of 100,000,000 *Homo sapiens* as they did in the 2000 and 2016 elections? Does it not make it easier for a political party to rig an election when the those who make up the electoral college are nominated either by state chapters of nationally oriented political parties, by voters in primaries, in party conventions, by the campaign committee of each candidate, by state legislatures, or appointed by the political parties themselves? How can an electoral college be considered a form of true democracy? How can such an injustice like this take place in a democracy? What good are electronic voting machines if they can be hacked and manipulated so easily?

Homo sapiens as a whole agree on the basic principles of democracy and freedom, this is clearly evident in how many democratic based governments have existed throughout all of history from the Greeks to present. But today, most United States citizens do not know the details of the Constitution nor the names of the current Supreme Court Justices, much less who the members of the Presidential cabinet are, in fact the vast majority do not even know who their Congressman, Senator, or other local government representatives are. The lack of citizen involvement in government can also be seen in how many uncontested elected offices there are in each election. During the November 2014 elections in 46 states, there were 6,057 state legislative districts with a seat up for election and 1,797 of the candidates faced no opposition during both the primary and general election. Out of the 6,057 seats up for election, 5,049 (83.4%) of the incumbents ran for re-election with 1,724 (34.1%) of them advancing through the 2014 elections without any opposition whatsoever. (171) Many other smaller local government offices also go uncontested during elections and are easily obtainable by one candidate, which much of time has no experience and is usually unqualified for the position. A study in 2015 found that 85% of incumbent prosecutors in the United States run unopposed, and interestingly 95% percent of the United States elected prosecutors are white and 83% percent are men. (112) There seems to be very little public discourse from the lack of public interest in political issues and about what the government is actually doing. Why do so many constantly complain about the government and yet never make any effort to get involved to change the government they are so critical of?

Political dynasties have also had a great influence on the political decisions of the past, families like: the Adamases, Bushes, Clintons, Cuomos, Kennedys, Lees, Longs, Roosevelts, Tafts, Udalls, and Harrisons have all had major influence and control over the United States government during their reign. Aren't these political dynasties contrary to democracy? Why has this been so accepted in a country of democracy which was founded on the exact opposite of this? Should there not be more diversity in government? When members of the Senate, Congress, and other high government positions remain in office for decades, does the government not seem more stagnant and less democratic? The only two major political parties, the republicans and the democrats, have been running the United States Government for the last 188 years, has this not created stagnation, corruption, deadlocks, and favoritism? How can self-interested politicians be allowed to govern the redistricting process and gerrymander the system, allowing the representative to choose their voters and not the voters choosing their representative? How can so many gullible Americans allow politicians to use demagogue like tactics to fool them with fearmongering and with such a negative message that is so blatantly negative, biased, and racists in nature? Would the Russian hacking, manipulation of social media, or fake news during the 2016 election have even mattered if more Americans weren't so gullible? Why are there age of candidacy laws for the Presidency, Vice Presidency, Senate, House of Representatives, and some other elected offices? Is this not age discrimination? What will the political system of the United States be like in 50 years if more minorities are elected to positions in the local, state, and federal government? The number of presidential news conferences has

fallen from an average of 72 press conferences per year when Calvin Coolidge was in office, to 20 press conferences per year during the Obama administration. (697) How can a president which is supposed to represent a government of the people, by the people, and for the people be so isolated from the people? Why is there a press secretary, shouldn't the president address the American public directly on a daily basis, even if for 10 minutes to briefly discuss what his daily activities consist of? How can the words of politicians be taken as honest and sincere when they are created by a team of speech writers and not by the one conveying the actual message?

The presidential pardon was intended to correct judicial error with thousands of pardons and commutations having been issued over the last 240 years, but has since become a political tool to allow criminals to escape justice. Political expediency can be seen in the pardons of Richard Nixon, Roger Clinton, I. Lewis Libby, Marc Rich, Caspar Weinberger, and others. Why is the public not more outraged when these convicted criminals receive a pardon or commutation? What point does it serve to convict a high-profile criminal when the criminal can get a pardon or commutation? The president is not an acting attorney or judge, and might also have very little legal experience, what right does a president have to pardon or commute the judicial sentence of a convicted criminal? How can the functioning justice system of a democracy be overridden by one individual as if it were an autocracy? Should not these legal cases go through the appeals process and ultimately to the Supreme Court to decide if need be, instead of being decided by a possibly unqualified, biased, or corrupt individual?

Ever since the Pentagon Papers were exposed in 1971 by Daniel Ellsberg, it has been widely known that the United States government operates secretly when it comes to some international and even domestic issues. The United States government hides information and facts by deeming anything they want kept secret as '*Top Secret*' or '*Classified*', while records and other evidence are sometimes destroyed or conveniently lost. And even with Executive Order 13526 and the Freedom of Information Act, documents and other reports 75 years old along with the truth remain hidden from the American public. When documents are released through the Freedom of Information Act, many times they are redacted to the point of being useless and making the release pointless. Why are so many government reports and government committee findings marked as classified and kept secret from the American public? (e.g. the Committee Study of the Central Intelligence Agency's Detention and Interrogation Program, a report compiled by the United States Senate Select Committee on Intelligence (SSCI) about the Central Intelligence Agency (CIA)'s Detention and Interrogation Program and the use of various forms of torture on detainees between 2001 and 2006 during the '*War on Terror*'. Of the final 6,000 page report, a total of 525 pages have been released to the public) Fortunately, for the world, history, and those who seek the truth there are insiders like Edward Snowden, Bradley Edward Manning, Barrett Brown, Russ Tice, William Binney, Thomas A. Drake, Mark Klein, Joel Clement, and other whistleblowers along with the some news media and other organizations like ExposeFacts, OpenSecrets, GlobalLeaks, LiveLeak, Wikileaks, and others which help to expose the lies and spread the truth with factual evidence which has been hidden from the world.

There must be 100% transparency if government is to ever truly be of the people, by the people, and for the people. Although there is far more transparency and accountability now than in years past, there is still much secrecy. Secret meetings like that of the Bilderberg Group with the political, business, and academia elite from Europe and North America have been occurring each year since 1954 and have always lacked transparency and accountability. Sometime in the late 1980s or early 1990s when computers and printers were becoming mainstream, United States government agencies in cooperation with printer manufacturers and a consortium of banks implemented a secret printer steganography tracking system utilizing hidden codes which can identify the exact printer used in printing any paper. This hidden technology has been used to catch counterfeiters, whistleblowers, kidnappers, and other criminals but was only recently discovered by consumer privacy advocates. (374) Why are the government and corporations working together in secret to have the ability to track any piece of paper ever printed in the world? Would consumers have willingly accepted this tracking if they were initially informed of it? Why are global and domestic surveillance programs and tools like: STORMBREW, MUSCULAR, OAKSTAR, ICREACH, MARINA, Dropmire, TRAFFICTHIEF, MonsterMind, Fusion centers, MAINWAY, ECHELON, Frenchelon, Carnivore, PINWALE, Fairview, MYSTIC, DCSN, Tempora, PRISM,

Boundless Informant, DISHFIRE, Stingray, BULLRUN, XKeyscore, and others allowed to operate with so little public knowledge, oversight, and in such secrecy? Can a balance of security and privacy be achieved with global surveillance programs and tools if there is more transparency and oversight? How can government officials like J. Edgar Hoover be allowed to amass so much power while abusing it for more than 48 years? How could McCarthyism last for so long ruining the lives of so many in such a democratic and free nation? How could a government agency be allowed to conduct COINTELPRO projects against its own citizens, which attempted to surveil, infiltrate, discredit, and disrupt the Civil Rights Movement, Black Power movement, feminist organizations, anti-Vietnam War organizers, independence movements, other New Left organizations, or anyone else which the FBI deemed subversive?

Many *Homo sapiens* around the world give a very large sum of their earned income to the government in the form of taxes, on average around 25%, but sometimes as high as 40%. (86) In most parts of the world this is in addition to the sales tax paid on nearly every item purchased and consumed including food, water, medicine, and other commodities. Furthermore, many pay taxes on things annually that they have already paid for in full and already paid a sales tax on such as a property or automobile, and if one inherits money they must again pay taxes on money that has already been taxed and collected on. With so many taxes it leaves very little left of the actual income to the one earning it. Some of the taxes collected are wasted on useless projects, exorbitant salaries, or other senseless expenses in a continuous cycle of mismanagement and greed. While taxes in the United States have remained relatively the same over the last decade the spending has increased dramatically. In 2000, there was a \$236,000,000,000 surplus, by 2009 it turned into a \$1,400,000,000,000 deficit with outlays more than doubling for national defense, Medicare, and other health programs. (87) With the Iraq and Afghanistan wars and a meat consuming population which has a healthcare industry based on profits, is there any wonder as to why this surplus turned into a deficit? How can the United States government, the wealthiest country in the world, have government shutdowns due to failed legislation? Why are political parties allowed to stop a functioning government and hold the government hostage in order to engage in their constant political tug-of-war? Shouldn't the ultimate goal of every politician be to work towards the progression of government and not to hinder it?

Poverty, Money, Greed, and Corporate Responsibility

There is in fact very little in this world that has not been touched, changed, influenced, or corrupted by money, and it is usually in the form of nature. There is nothing wrong with many of the ideas and systems that are already in place which organization and help manage society, but like anything it can be beneficial if used properly, or detrimental if abused. Take money for example, it has been in existence since the dawn of civilization in one form or another, be it seashells, cocoa beans, gold, paper, or data, and it will most likely continue to exist as it helps to facilitate trade and organize commerce among other things. But again, it can be used in a beneficial or detrimental way and the decision is up to the individual who possesses it. One could be like the wealthy individuals which use their acquired money for beneficial things that help many unfortunate *Homo sapiens* by promoting education, helping to cure diseases, helping to rebuild devastated areas, etc. Or one can be the total opposite and live like a fool squandering it on lavish useless things or hoarding their wealth for a lifetime while doing nothing with it to change the world in a positive way. Like most everything else, it is simply a matter of morals and individual choice which makes money bad, and only when those abuse it with greed and ignorance. If necessities in life like food, medicine, and government are based mainly on money and profits, and not on providing nutrition, medical care, and service to citizens, then they will most likely always be of poor quality, over-priced, and corrupt. Albert Einstein said,

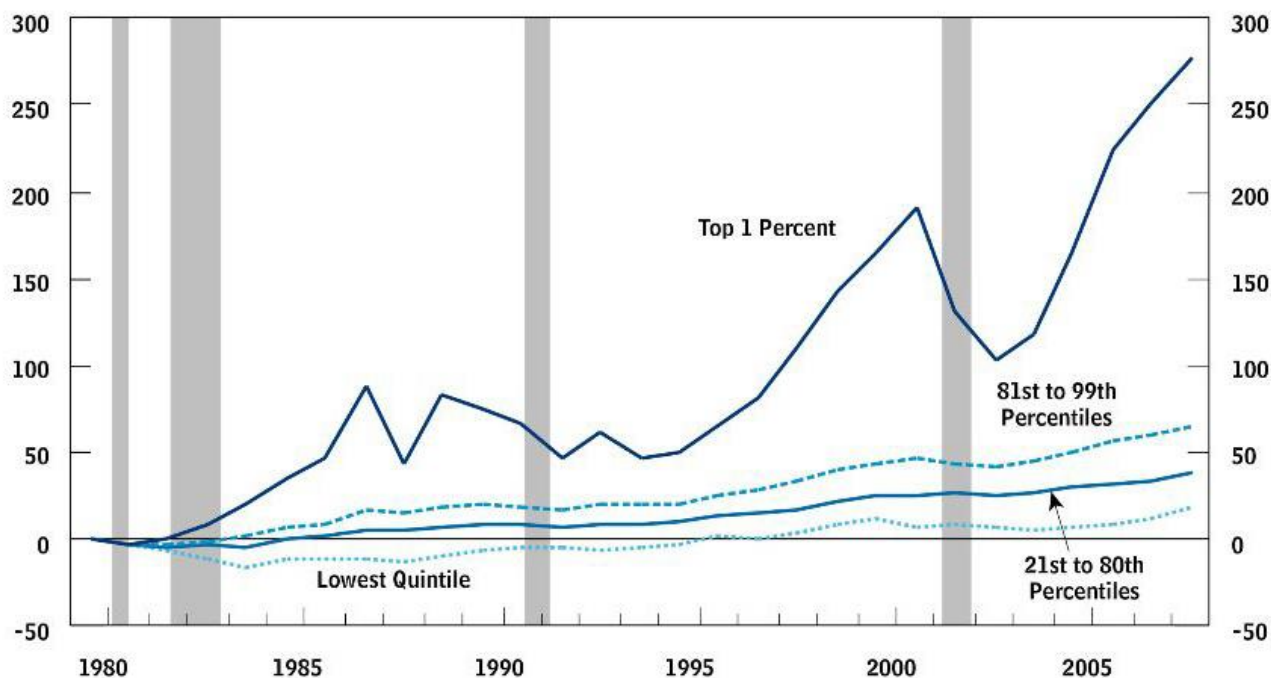
"I am absolutely convinced that no wealth in the world can help humanity forward, even in the hands of the most devoted worker in this cause. The example of great and pure individuals is the only thing that can lead us to noble thoughts and deeds. Money only appeals to selfishness and irresistibly invites abuse." (55)

"However, the production and distribution of commodities is entirely unorganized so that everybody must live in fear of being eliminated from the economic cycle, in this way suffering for the want of everything. Furthermore, people living in different countries kill each other at irregular time intervals, so that also for this reason anyone who thinks about the future must live in fear and terror. This is due to the fact that the intelligence and character of the masses are incomparably lower than the intelligence and character of the few who produce something valuable for the community." (57)

“The economic anarchy of capitalist society as it exists today is, in my opinion, the real source of the evil. We see before us a huge community of producers the members of which are unceasingly striving to deprive each other of the fruits of their collective labor-not by force, but on the whole in faithful compliance with legally established rules.” (64)

There is an estimated \$80,900,000,000,000 cash dollars in the world (167). In 2015, there were 1,826 billionaires (166) in the world with an estimated wealth of \$7,100,000,000,000 and an estimated 15,360,000 millionaires with an estimated wealth of \$58,700,000,000,000. (165) If this rich minority took out their worth in cash that would leave \$15,000,000,000,000 for the remaining 7,150,000,000 *Homo sapiens* on Earth or around \$2,098 per person. If one took \$0.01 and doubled it every day for 30 days, they would have \$10,737,418. Is money that easy to make? Does it really truly exist, or is it just what society deems it to be and really nothing more than a number? Is the monetary value of something what someone declares it is worth, or only what someone will pay for it? The Giving Pledge has 158 pledges, mostly billionaires, amounting to \$365,000,000,000 dollars which has been pledged to be given to philanthropic causes during their lifetime or upon the pledges death. What is the point of pledging something and waiting so long, why can't a billionaire just keep enough to exist for the remainder of their lifetime and give the rest immediately to a philanthropic cause? What is the point of money if it is just sitting invested making interest, is it not meant to be spent? Why are antiquated monarchs even recognized with the descendants of kings and queens still given a thrown, real estate, and money? Why do the decedents of the king's once subjects still honor and worship these antiquated socialites like they are out of some fairy tale? Do they forget how their ancestors where oppressed under the rule of the monarchy for hundreds of years?

Percentage change in income since 1979, adjusted for inflation



SOURCE: Congressional Budget Office - CBO finds that, between 1979 and 2007, income grew by: 275 percent for the top 1 percent of households; 65 percent for the next 19 percent; just under 40 percent for the next 60 percent; and 18 percent for the bottom 20 percent. - <https://www.cbo.gov/publication/42729#section0>

In the United States there were 38,900,000 cost-burdened households in 2015, with 11,100,000 renter households being severely cost burdened with at least half their incomes going towards housing, a 3,700,000 increase from 2001. (657) As of December 2016, the total United States household indebtedness was \$12,580,000,000,000, with 4.8% of outstanding debt being in some stage of delinquency. Of the \$607,000,000,000 of debt which is delinquent, \$412,000,000,000 is seriously delinquent being at least 90 days late. (470) In the United States 43,100,000 *Homo sapiens* live in poverty, and 4,400,000 of them have a disability. (172) How can 43,100,000 *Homo sapiens* be living in poverty in a country of such great wealth and prosperity

like the United States? *Homo sapiens* seem to be not only addicted to money but to the fantasy of being instantly wealthy. In 2014, *Homo sapiens* in the United States spent \$70,150,000,000 on lottery tickets, (183) in spite of them only having a 1 in 258,890,850 chance of winning a Mega Million jackpot. (184) The global gambling market in 2009 was \$335,000,000,000 which included lotteries, casinos, and sports betting. (185) Why do so many spend so much on something that they have so little chance of winning at? By comparison, Americans spent \$14,600,000,000 on books that same year. (183) The United States Congressional Budget Office issued a report in 2016 which stated,

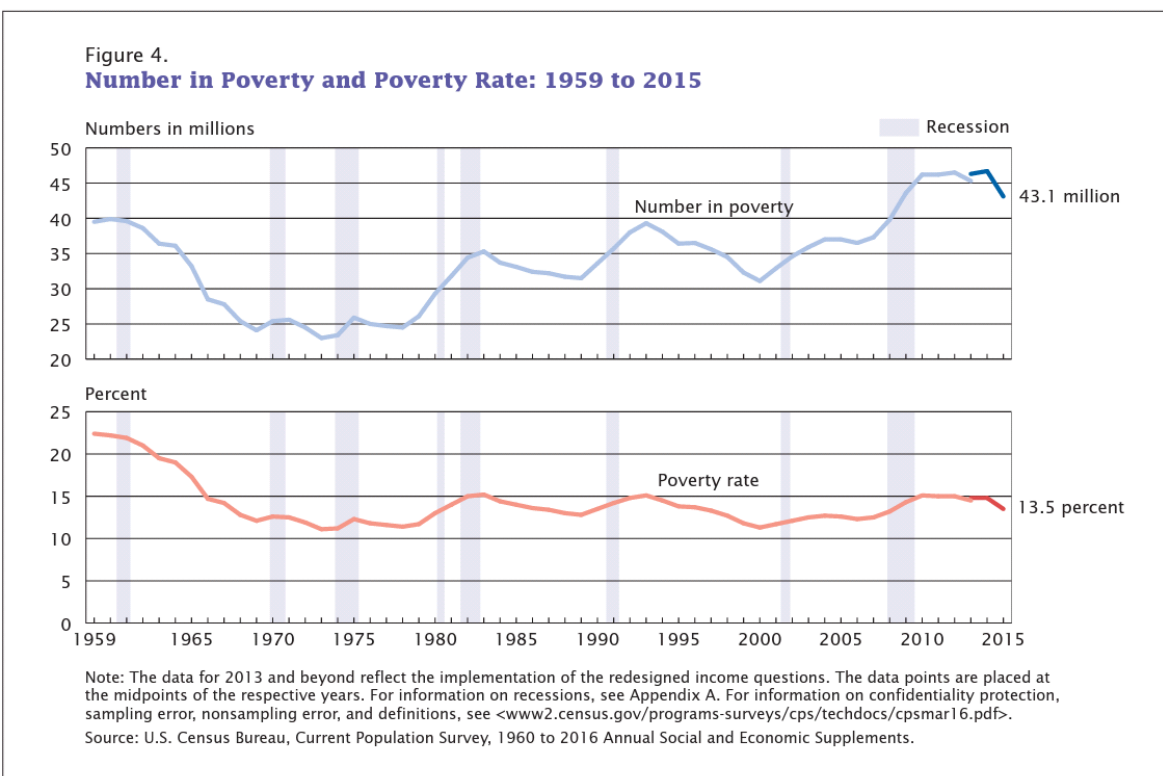
"In 2013, families in the top 10 percent of the wealth distribution held 76 percent of all family wealth, families in the 51st to the 90th percentiles held 23 percent, and those in the bottom half of the distribution held 1 percent."

"For those at the bottom of the distribution of wealth between 1989 and 2013, but especially after 2007, the share of families that had more debt than assets increased, as did their average indebtedness. For instance, 8 percent of families had more debt than assets in 2007, and they were, on average, \$20,000 in debt. By 2013, 12 percent of families had more debt than assets, and they were, on average, \$32,000 in debt."

"The distribution of wealth was more unequal in 2013 than it had been in 1989. In 2013, families in the top 10 percent held more than three-quarters of all family wealth, whereas in 1989, their counterparts had held two-thirds of all family wealth. Over the period, the share of wealth held by families in the 51st to the 90th percentiles declined from 30 percent to 23 percent, and the share of wealth held by families in the bottom half of the distribution declined from 3 percent to 1 percent."

"In 2013, those families were more in debt than their counterparts had been either in 1989 or in 2007. For instance, 8 percent of families were in debt in 2007 and, on average, their debt exceeded their assets by \$20,000. By 2013, in the aftermath of the recession of 2007 to 2009, 12 percent of families were in debt and, on average, their debt exceeded their assets by \$32,000."

The increase in average indebtedness between 2007 and 2013 for families in debt was mainly the result of falling home equity and rising student loan balances. In 2007, 3 percent of families in debt had negative home equity: They owed, on average, \$16,000 more than their homes were worth. In 2013, that share was 19 percent of families in debt, and they owed, on average, \$45,000 more than their homes were worth. The share of families in debt that had outstanding student debt rose from 56 percent in 2007 to 64 percent in 2013, and the average amount of their loan balances increased from \$29,000 to \$41,000." (463)



In 2016, the United Nations Human Settlements Programme estimated there were 881,000,000 urban residents

living in slums throughout the world, a 28% increase from 689,000,000 in 1990. (292) In 2005, the United Nations estimated that there were 100,000,000 *Homo sapiens* throughout the world completely homeless. (301) In addition to this, UNESCO also estimates there are up to 150,000,000 'street children' currently living on the streets of the world, scavenging and begging as a result of being forced from a home by violence, the death of a parent, family breakdown, war, drug and alcohol abuse, socio-economic collapse, or natural disaster. (299) The 2016 Annual Homeless Assessment Report (AHAR) delivered to the U.S. Congress by the U.S. Department of Housing and Urban Development reported that on a single night in January 2016 in the United States 549,928 individuals were experiencing homelessness, a 15% decline from 647,258 in 2007. Of this total, 373,571 individuals were staying in emergency shelters, transitional housing programs, or safe havens while the remaining 176,357 were staying in unsheltered locations with more than 52,890 of these individuals being chronically homeless. Of those individuals that experienced homelessness in 2016, some 120,819 or 22% were children, and 9 in 10 children experiencing homelessness were either staying in emergency shelters or transitional housing programs. In 2016, there were 867,102 year-round beds available in United States emergency shelters, transitional housing, permanent housing, safe havens, rapid rehousing, and other permanent supportive housing. (586) In the United States, since 1987, some cities have simply relocated their homeless to other mainland cities within the United States and sometimes even relocated them internationally passing the burden onto other cities and other countries. A comprehensive investigation done by the Guardian in 2017 tracked 21,400 homeless bus relocations between 2011 and 2017. (651) With so many available shelters and programs, why are so many in unsheltered locations? Why do so many thousands of individuals experience homelessness? One need only watch 'Homeless Bound L.A. Skid Row' www.homelessboundla.com to see the true reality of homelessness in a nation which has so many resources and so much wealth while the homeless population has been ignored by most. Why are millions homeless in a world with millions of vacant houses, hotel rooms, and government buildings? If real estate is primarily based on monetary factors and not social use, there could always be chronic homelessness in a world of vacant buildings. When Philip Alston, the U.N.'s Special Rapporteur on extreme poverty and human rights, visited Alabama he saw inadequate sanitation and residents which often contract *E. Coli* and hookworm as a result and remarked that the sewage disposal crisis was the direst he had seen in any developed country. (621) A 2017 United Nations Human Rights report concluded that,

"International and domestic financial institutions and markets are created and sustained by Governments and must be made accountable to States human rights obligations. Millions of foreclosures, evictions and displacements and more than a billion people living in grossly inadequate housing conditions and homelessness worldwide signal, among other things, the failure of States and of the international community to manage the interaction between financial actors and housing systems in accordance with the right to adequate housing. The value of global real estate is about US\$ 217 trillion, nearly 60 per cent of the value of all global assets, with residential real estate comprising 75 per cent of the total. In the course of one year, from mid-2013 to mid-2014, corporate buying of larger properties in the top 100 recipient global cities rose from US\$ 600 billion to US\$ 1 trillion."

"Elsewhere, financialization is linked to expanded credit and debt taken on by individual households made vulnerable to predatory lending practices and the volatility of markets, the result of which is unprecedented housing precarity. Financialized housing markets have caused displacement and evictions at an unparalleled scale: in the United States of America over the course of 5 years, over 13 million foreclosures resulted in more than 9 million households being evicted. In Spain, more than half a million foreclosures between 2008 and 2013 resulted in over 300,000 evictions. There were almost 1 million foreclosures between 2009 and 2012 in Hungary."

"The 2008 global financial crisis revealed the fragility, volatility and predatory nature of financialized housing markets and the potential for catastrophic outcomes both for individual households and for the global economy. In the United States of America, there were an average of 10,000 foreclosures per day in 2008, and as many as 35 million individuals were affected by evictions over a five-year period. Not only had people lost their homes but they faced personal financial ruin."

"Housing prices in so-called 'hedge cities' like Hong Kong, London, Munich, Stockholm, Sydney and Vancouver have all increased by over 50 per cent since 2011, creating vast amounts of increased assets for the wealthy while making housing unaffordable for most households not already invested in the market."

A significant portion of investor-owned homes are simply left empty. In Melbourne, Australia, for example, 82,000 or one fifth of investor-owned units lie empty. In the affluent boroughs of Chelsea and Kensington in the city of London, prime locations for wealthy foreign investors, the number of vacant units increased by 40 per cent between 2013 and 2014. In such markets, the value of housing is no longer based on its social use. The housing is as valuable whether it is vacant or occupied, lived in or devoid of life. Homes sit empty while homeless populations burgeon."

"Corporate finance does not only profit from inflated prices in hedge cities, it also profits from housing crises. The global financial crisis created unprecedented opportunities for buying distressed housing and real estate debt, which was sold off at fire sale prices in countries such as Ireland, Spain, the United Kingdom of Great Britain and Northern Ireland and the United States of America. The Blackstone Group, the world's largest real estate private equity firm, managing \$102 billion worth of property, spent \$10 billion to purchase repossessed properties in the United States of America at courthouses and in online auctions following the 2008 financial crisis, emerging as the largest rental landlord in the country. Other major institutional players invested \$20 billion to purchase approximately 200,000 single-family homes in the United States between 2012 and mid-2013."

"Many corporate owners of housing are nameless. In the first fiscal quarter of 2015, 58 per cent of all property purchases over \$3 million in the United States were made by limited liability companies rather than named people, and the majority of those purchases were in cash, creating a greater level of anonymity." (300)

In 2015 and 2017, some 24,900,000 documents were leaked dubbed the '*Panama Papers*' and '*Paradise Papers*', which detail the secretive offshore financial world involving governments, businesses, and the wealthy elite while also implicating politicians, public officials, and their close associates. Some of the shell corporations were used for illegal activities like fraud, tax evasion, and to evade international sanctions. In 2011, 60 major U.S. corporations funneled \$166,000,000,000 to offshore locations allowing them to avoid taxes on more than 40% of their annual profits. (191) A recent study in 2017 of 258 Fortune 500 companies that were consistently profitable in each year between 2008 and 2015 found that many of the corporations paid far less than the 35% federal income tax rate for profitable corporations and some paid nothing at all because of numerous tax loopholes and special breaks they receive. The study found that,

"As a group, the 258 corporations paid an effective federal income tax rate of 21.2 percent over the eight-year period, slightly over half the statutory 35 percent tax rate. Eighteen of the corporations, including General Electric, International Paper, Priceline.com and PG&E, paid no federal income tax at all over the eight-year period. A fifth of the corporations (48) paid an effective tax rate of less than 10 percent over that period. Of those corporations in our sample with significant offshore profits, more than half paid higher corporate tax rates to foreign governments where they operate than they paid in the United States on their U.S. profits.

One hundred of the 258 companies (39 percent of them) paid zero or less in federal income taxes in at least one year from 2008 to 2015. The sectors with the lowest effective corporate tax rates over the eight-year period were Utilities, Gas and Electric (3.1 percent), Industrial Machinery (11.4 percent), Telecommunications (11.5 percent), Oil, Gas, and Pipelines (11.6 percent), and Internet Services and Retailing (15.6 percent). Each of these industries paid, as a group, less than half the statutory 35 percent tax rate over this eight-year period. The tax breaks claimed by these companies are highly concentrated in the hands of a few very large corporations. Just 25 companies claimed \$286 billion in tax breaks over the eight years between 2008 and 2015. That's more than half the \$527 billion in tax subsidies claimed by all of the 258 companies in our sample. Five companies — AT&T, Wells Fargo, J.P. Morgan Chase, Verizon, and IBM — enjoyed more than \$130 billion in tax breaks during the eight-year period." (241)

Global saving glut or cash hoarding by the minority of wealthy individuals and more especially by corporations has increased dramatically. Moody's reported that the amount of cash which was held by non-financial companies in the United States was \$1,840,000,000,000 in 2016, a 9.2% increase from the \$1,680,000,000,000 hoarded away in 2015. (589) If laws were enacted and enforced to help prevent this hoarding and hiding of money, how much lower would individual taxes be? How many positive things like education, medicine, conservation, etc. could this money have been spent on?

Society's prevailing ignorance is as apparent as it always has been throughout history in that negative things, (e.g. cigarettes, alcohol, guns, etc.) are legal and even encouraged and thus used even though it is known that they have a negative impact and can even cause death. This ignorance is often masked under the term '*Freedom*' or '*A God Given Right*'. Societies have laws and attempt to prevent things like murder and other activities which are deemed as crimes, so why is it that other negative things like cigarettes and guns are legal and often even encouraged? The government has many laws to protect citizens, so why are the tobacco, alcohol, meat and dairy, asbestos, oil, plastic, chemical, and other similar industries allowed to make money off a product that the government knows has killed millions of *Homo sapiens* or destroys Earth and continues to every day? Why does the government stop some harmful things, yet when it comes others which are based around money and profits it is ok to kill *Homo sapiens*? Where is the justice for the millions of *Homo sapiens* which have died as a result of some companies knowingly and willingly selling deadly products and services to consumers they know could be

potentially harmful to their health? What good is a scientific study for human health or environmental protection if it is done by the corporations themselves and not an independent scientifically accredited unbiased source? Many corporations have been irresponsible towards Earth and society all in the name of money and profit, they have lied and mislead the public through propaganda campaigns aimed at debunking scientific evidence and ultimately attempted to hide their true actions and the negative consequences which result from using their products. Most product packaging far out lasts the product which is contained within that product packaging, this is especially true for food products. Where is the corporate responsibility for the littering of trillions of pieces of product packaging that is now trash and pollutes the Earth? Shouldn't the company be held accountable to clean up the mess it created all in the name of profits?

Modern society basing nearly everything around money and profits with little or no regard if it damages other *Homo sapiens* or the Earth, is a true '*tragedy of the commons*'. If governments and corporations continue to push for solutions with technology based around profits, and not solutions based on coexistence, conservation, sustainability, and moderation, will the environmental issues continue to occur and perhaps get even worse? If environmental issues occur and the pseudo solution is only further destruction, and not logically analyzing and solving the cause of the issue, how can the issues ever truly be solved? Why do *Homo sapiens* continuously attempt to solve avoidable issues with technology instead of coexisting on Earth by practicing conservation and using the precious limited resources cautiously? If manufacturers have the ability to make eco-friendly products and don't want to willingly work towards conservation, then shouldn't the government create more legislation which requires them to do so? If energy efficient appliances and electronics are available and have been for some time, why is there even a choice, why not a law requiring that all appliances and electronics be designed so they are energy efficient? If front-load washing machines are more efficient than top-load washing machines using half the amount of water, why then not enact a law requiring all washer machines be made in the front-style manner? Why are there not more environmental laws requiring commercial companies to make all their products eco-friendly, energy efficient, biodegradable, and more durable for a longer lifespan to use the product? Products in the past were made far more durable, and this was what companies often took pride in and what eliminated their competition. Most companies today base product manufacturing not on quality and lifespan use, but how many they can make, and how many they can get a consumer to purchase during their lifetime. Martin Luther King Jr. wrote,

"The stability of the large world house which is ours will involve a revolution of values to accompany the scientific and freedom revolutions engulfing the earth. We must rapidly begin the shift from a "thing"-oriented society to a "person"-oriented society. When machines and computers profit motives and property rights are considered more important than people, the giant triplets of racism, materialism, and militarism are incapable of being conquered. A civilization can flounder as readily in the face of moral and spiritual bankruptcy as it can through financial bankruptcy.

This revolution of values must go beyond traditional capitalism and Communism. We must honestly admit that capitalism has often left a gulf between superfluous wealth and abject poverty, has created conditions permitting necessities to be taken from the many to give luxuries to the few and has encouraged smallhearted men to become cold and conscienceless so that, like Dives before Lazarus, they are unmoved by suffering, poverty-stricken humanity. The profit motive, when it is the sole basis of an economic system, encourage a cutthroat competition and selfish ambition that inspire men to be more I-centered than thou-centered." (665)

In the 1970s Americans were exposed to around 500 ads per day, in 2003 this number increased to 5,000 ads per day. (557) Today native advertising is replacing traditional advertising, and many times consumers are fooled into thinking that an advertisement is an actual news story or requested Internet content, with the mini words '*ad*' often camouflaged which makes it nearly unnoticeable. If there were no commercial advertising and consumers simply sought out a product or service when they needed it, how much less consumption would there be? The PBS Frontline reports: '*The Persuaders*' November 9, 2004, '*The Merchants of Cool*' February 27, 2001, and '*Generation Like*' February 18, 2004 all detail how corporations utilize marketing, and how through new technologies they are marketing and influencing a new generation of consumers. In addition, the BBC documentary '*The Century of the Self*' by Adam Curtis 2002, explains how Edward Bernays used propaganda to help corporations influence consumer decisions. In Bernays 1928 book '*Propaganda*' he said,

"The conscious and intelligent manipulation of the organized habits and opinions of the masses is an important element in democratic society. Those who manipulate this unseen mechanism of society constitute an invisible government which is the

true ruling power of our country.

We are governed, our minds are molded, our tastes formed, our ideas suggested, largely by men we have never heard of. This is a logical result of the way in which our democratic society is organized. Vast numbers of human beings must cooperate in this manner if they are to live together as a smoothly functioning society.

In almost every act of our daily lives, whether in the sphere of politics or business, in our social conduct or our ethical thinking, we are dominated by the relatively small number of persons...who understand the mental processes and social patterns of the masses. It is they who pull the wires which control the public mind.” (33)

Most current business models in today's society are based mainly on greed and profits through how many products can be sold, and it has ultimately led to the '*throw away and buy a new product*' consumer habits and attitudes. This mentality was invented by corporations to bolster product consumption and increase profits, and it began being encouraged around 60 years ago by corporations through advertisements and even the mainstream news media with stories like the August 1955 LIFE magazine article titled '*Throwaway Living*'. Some products have built-in obsolescence to ensure that the product will become obsolete or unfashionable very soon after purchase, and thus force the consumer to buy the newer version. Many products are manufactured so cheaply that one piece of the product will fail, (e.g. a wheel, handle, zipper, battery, etc.) making the product useless, replacement parts are rarely if ever available, or are often more expensive than to buy a new one, so consumers have no choice but to discard the nearly usable product and buy a new one. Why are business models based on profits and not creating a good quality product? Shouldn't businesses create products based on the following criteria: 1. How eco-friendly the product is, 2. How well the product functions, and 3. How long the product can be used? What if competition of commercial products was based on quality and environmentally friendliness versus advertising and pseudo information? To think of how some *Homo sapiens* running these corporations are acting towards not only the Earth, but to fellow *Homo sapiens* is beyond imagination. How can anyone take advantage of something solely for the profit of money, while killing nature and *Homo sapiens* alike indiscriminately and willingly?

Perhaps at some point *Homo sapiens* will see the reality and want something different, and maybe then they will also see that the system is what needs fixing, old methods changed, and that those running it need replacing. Commercial companies, purely for profits are creating mass produced products and influencing consumers to think they want or need these products, when in fact they do not truly want or need them at all. If products are invented and manufactured based around consumption and money versus actual need and use, then there will be most likely be a continuous stream of mass produced junk serving no real purpose other than to pollute Earth and give consumers pseudo satisfaction. If this continues the mass consumption will continue, and the cycle of waste will perhaps never end and become even worse. If consumers can stop being so easily persuaded into purchasing needless products based on the propaganda of commercial companies, this will eliminate much of the mass consumption and waste. Will consumers ever wise up to corporate marketing tactics and see the reality that the corporations are engaged in to make the almighty dollar? Perhaps *Homo sapiens* will one day recognize they are being used and manipulated by corporations into living their current consumption-based lifestyles, and how they have allowed some corporations to rule their lives and push unhealthy and environmentally destructive products and services on them for the last 100 years. Perhaps citizens will demand the government enact stricter conservation laws and force commercial companies to move towards more environmentally friendly practices like it has already begun to do, and thus the consumer will have no choice but to buy green products as that will be all that is available for consumption. *Homo sapiens* can be forced towards conservation by laws and no other option, but society would move far more willingly and rapidly if shown through education and by example the correct way of doing things.

If things are to change either consumers will demand natural alternatives and change with their lifestyle choices, commercial companies will see the wrong of their actions, or commercial companies and citizens will be forced into change by the government through regulations enacted to help safeguard the environment and consumer health. Commercial companies very easily could use their current marketing techniques and make the mainstream choices for consumption more natural while still making money and profits, consumers will always be consuming, it is simply a matter of what is available to consume. Shouldn't commercial companies who make the products available for consumption be responsible for not only making the product safe for consumers, but

also making an environmentally friendly product by making it healthy, non-toxic, natural, and bio-degradable? It is a matter of the company either not caring about the side-effects and the negative consequences of their actions, or they do not see the wrong in their ways and are delusional to the point of thinking they are actually helping *Homo sapiens*, when in fact they are doing just the opposite. Paul Hawken wrote,

"The ultimate purpose of business is not, or should not be, simply to make money. Nor is it merely a system of making and selling things. The promise of business is to increase the general well-being of humankind through service, a creative invention and ethical philosophy. Making money is, on its own terms, totally meaningless, an insufficient pursuit for the complex and decaying world we live in. We have reached an unsettling and portentous turning point in industrial civilization." (662)

As a result of consolidations, acquisitions, mergers, forced bankruptcies, and other takeover methods many business sectors today are now oligopolies, and it has also created a monopoly in some industries affecting supply and demand, and ultimately allowed some corporations to practice price fixing while also exercising vast influence and control over consumer choices. This has also led to less quality, innovation, and over pricing in some industries and services, while also limiting consumer access to basic things like Internet access, medical services, education, etc. Profit margins are exorbitant on many necessities like food, medical care, funeral services, automobile repair, legal representation, etc. There seems to be no limit on how much profit an individual or companies are willing to make, leading to further greed and resulting in even more unfortunate victims of the greed. The exorbitant prices on many things is appalling, charging consumers \$400 for an item that only cost \$25 to manufacture, and even worse these vast profits go mostly to a few individuals and not those who actual invent, manufacture, transport, and sell the product. How can businesses practice price gouging during natural disasters or public gatherings? How can it be legal to charge \$5 or more for a small bottle of water which is something that is a vital necessity to live? Why are there not more price ceilings enacted by the government on commodities to prevent such price gouging?

Some businesses now force customers to purchase unnecessary and unwanted things, and some even charging for things that were previously free. (e.g. many restaurants are now forcing customers to buy bottled water and refusing to serve tap water) While other businesses make vast profits by charging for what they call a '*convenience fee or service charge*', one cannot even access their money without sometimes being charged an outlandish fee by their own and other banks. JP Morgan Chase, Bank of America, and Wells Fargo combined made \$6,000,000,000 from ATM and overdraft fees in 2015. (227) Americans have around \$750,000,000,000 in credit card debt, and with no legal limits on the amount of interest or fees that a credit card company can charge a consumer, it has helped to make credit cards one of the most profitable sectors for the banking industry. The November 2004 PBS Frontline program, '*The Secret History of the Credit Card*' gives a detailed perspective and history on the credit card industry.

The 2007 and 2008 world food price crises as well as the 2011 and 2012 world food price increases were blamed on oil prices, drought, overpopulation, low food surpluses, and other economic factors. After the food price increases in the United States, food prices rose, and many food companies in response made the product size less while maintaining the increased price point, a business practice called shrinkflation. In the United Kingdom, between 2012 and 2017, there were 2,529 retail products, 2,006 of which were food items, that decreased in size while the price of most products remained the same. (462) Could the increased food prices be in part caused by corporate greed? Five main exporters provide around 90% of maize, 80% of rice, and 70% of wheat to the world. If the world's main foods were more varied and not restricted to maize, rice, and wheat, could possible future food crises be avoided?

Financial institution failures have become more commonplace recently. Between 1935 and 1942 there were 381 financial institutions which completely failed, between 1980 and 1994 there were 2,354 financial institutions which failed completely, and 570 additional ones which received a government bailout to sustain operations. Between 2008 and 2014 there were 504 financial institutions which failed completely and 13 which required a government bailout to sustain operations. During the other years in between these financial crises there were on average less than 10 per year. (556) Perhaps this is a sign that capitalism in its current form can only go for so long with corruption and greed taking its toll until eventually the system has been plundered and must be reset

with bailouts, the government must step in and change interest rates, and enact new laws to help prevent future manipulation and crashes. But as history has shown with corrupt financial systems that are constantly being manipulated negatively, the only thing that truly eliminates all greed and corruption is strict laws and most important, the refusal to take part in it.

Some Major Financial Fiascos	
Tulip Mania	Tulip mania was a period in the Dutch Golden Age during which contract prices for bulbs of the recently introduced tulip reached extraordinarily high levels and then suddenly collapsed. At the peak of tulip mania, in March 1637, some single tulip bulbs sold for more than 10 times the annual income of a skilled craftsman. It is generally considered the first recorded speculative bubble (or economic bubble), although some researchers have noted that the Kipper- und Wipperzeit episode in 1619–22, a Europe-wide chain of debasement of the metal content of coins to fund warfare, featured mania-like similarities to a bubble. Nearly a century later, during the crash of the Mississippi Company and the South Sea Company in about 1720, tulip mania appeared in satires of these manias. When Johann Beckmann first described tulip mania in the 1780s, he compared it to the failing lotteries of the time. In Goldgar's view, even many modern popular works about financial markets, such as Burton Malkiel's <i>A Random Walk Down Wall Street</i> (1973) and John Kenneth Galbraith's <i>A Short History of Financial Euphoria</i> (1990; written soon after the crash of 1987), used the tulip mania as a lesson in morality. Tulip mania again became a popular reference during the dot-com bubble of 1995–2001.
Black Tuesday	The Wall Street Crash of 1929, began on October 24, 1929 ("Black Tuesday"), and was the most devastating stock market crash in the history of the United States, when taking into consideration the full extent and duration of its after effects. The crash, which followed the London Stock Exchange's crash of September, signaled the beginning of the 12-year Great Depression that affected all Western industrialized countries.
The Brothers	The Brothers was a large investment operation in Costa Rica, from the late 1980s until 2002, eventually exposed as a Ponzi scheme. The fund was operated by brothers Luis Enrique and Osvaldo Villalobos. Investigators determined that the scam took in at least \$400 million. Most of the clientele were American and Canadian retirees but some Costa Ricans also invested the minimum \$10,000. About 6,300 individuals ultimately were involved. Interest rates were 3% per month, usually paid in cash, or 2.8% compounded. The ability to pay such high interest was attributed to Luis Enrique Villalobos' existing agricultural aviation business, investment in unspecified European high yield funds, and loans to Coca Cola, among others. Osvaldo Villalobos' role was primarily to move money around a large number of shell companies and then pay investors. In May 2007, Osvaldo Villalobos was sentenced to 18 years in prison for fraud and illegal banking, while Luis Enrique Villalobos remains a fugitive.
Jean Pierre Van Rossem	In the 1980's, Jean Pierre Van Rossem ran a stock market investment company called "Moneytron" in Belgium. The company was revealed to have been a scheme, Van Rossem had developed a so called model that could predict the stock market and beat the capitalist system. he invested for the very wealthy in the world and gathered around 860 million dollars (34.692.321.673 Belgian Franc). Due to belief in the Moneytron system and also his sense of show and publicity he made large sums of money. He also traded duplicated stocks. In 1991, he was sentenced to 5 years in jail for scams; according to him, it was "A way to fuck the system".
MMM Ponzi Scheme	MMM was a Russian company that perpetrated one of the world's largest Ponzi schemes of all time. By different estimates from 5 to 40 million people lost up to \$10 billion. The company started attracting money from private investors, promising annual returns of up to 1000%. It is unclear whether a Ponzi scheme was the initial intention, as such extravagant returns might have been possible during the Russian hyperinflation in such commerce as import-export.
Black Monday	In finance, Black Monday refers to Monday, October 19, 1987, when stock markets around the world crashed, shedding a huge value in a very short time. The crash began in Hong Kong and spread west to Europe, hitting the United States after other markets had already declined by a significant margin. The Dow Jones Industrial Average (DJIA) fell exactly 508 points to 1,738.74 (22.61%).
Savings and Loan Crisis	The savings and loan crisis of the 1980s and 1990s was the failure of 1,043 out of the 3,234 savings and loan associations in the United States from 1986 to 1995. A savings and loan or "thrift" is a financial institution that accepts savings deposits and makes mortgage, car and other personal loans to individual members (a cooperative venture known in the United Kingdom as a building society). By 1995, the RTC had closed 747 failed institutions nationwide, worth a total possible book value of between \$402 and \$407 billion. In 1996, the General Accounting Office estimated the total cost to be \$160 billion, including \$132.1 billion taken from taxpayers. The market share of S&Ls for single family mortgage loans went from 53% in 1975 to 30% in 1990. U.S. General Accounting Office estimated cost of the crisis to around \$160.1 billion, about \$124.6 billion of which was directly paid for by the U.S. government from 1986 to 1996. That figure does not include thrift insurance funds used before 1986 or after 1996. It also does not include state run thrift insurance funds or state bailouts. The federal government ultimately appropriated \$105 billion to resolve the crisis. After banks repaid loans through various procedures, there was a net loss to taxpayers of approximately \$124–132.1 billion by the end of 1999. Keating's Lincoln Savings failed in 1989, costing the federal government over \$3 billion and

	<p>leaving 23,000 customers with worthless bonds. In the early 1990s, Keating was convicted in both federal and state courts of many counts of fraud, racketeering and conspiracy. He served four and a half years in prison before those convictions were overturned in 1996. In 1999, he pleaded guilty to a more limited set of wire fraud and bankruptcy fraud counts, and sentenced to the time he had already served. Neil Bush, the son of then Vice President of the United States George H. W. Bush, was on the Board of Directors of Silverado at the time. Neil Bush paid a \$50,000 fine, paid for him by Republican supporters, and was banned from banking activities for his role in taking down Silverado, which cost taxpayers \$1.3 billion. An RTC suit against Bush and other Silverado officers was settled in 1991 for \$26.5 million.</p>
Romanian Ponzi Scheme	<p>In Romania, between 1991 and 1994, the Caritas scheme run by the "Caritas" company of Cluj-Napoca, owned by Ioan Stoica promised eight times the money invested in six months. It attracted 400,000 depositors from all over the country who invested 1,257 billion lei (about US\$1 billion) before it finally went bankrupt on August 14, 1994, having a debt of US\$450 million. The owner, Ioan Stoica, was sentenced in 1995 by the Cluj Court to a total of seven years in prison for fraud, but he appealed and it was reduced to two years; then he went on to the Supreme Court of Justice and the sentence was finally reduced to one year and a half.</p>
Towers Investors	<p>Towers Investors, a bill collection agency, collapsed in 1993; in 1995, chairman Steven Hoffenberg pleaded guilty to bilking investors out of \$475 million. Judge Robert W. Sweet sentenced him to 20 years in prison, plus a \$1 million fine and \$463 million in restitution. He settled a civil suit with the U.S. Securities and Exchange Commission for \$60 million. He briefly was the owner of the New York Post. At the time the SEC considered the fraud to be "one of the largest Ponzi schemes in history."</p>
European Kings Club Scheme	<p>In late 1994, the European Kings Club collapsed, with ensuing losses of about \$1.1 billion. This scam was led by Damara Bertges and Hans Günther Spachtholz. In the Swiss canton of Uri and Glarus, it was estimated that about one adult in ten invested into the EKC. The scam involved buying "letters" valued at 1,400 Swiss francs that entitled buyers to receive 12 monthly payments of 200 Swiss francs. The organisation was based in Gelnhausen, Germany.</p>
Bre-X Gold Scheme	<p>Bre-X was a group of companies in Canada. Bre-X Minerals Ltd., a major part of Bre-X based in Calgary, was involved in a major gold mining scandal when it reported it was sitting on an enormous gold deposit at Busang, Indonesia (in Borneo). Bre-X bought the Busang site in March 1993 and in October 1995 announced significant amounts of gold had been discovered, sending its stock price soaring. Originally a penny stock, its stock price reached a peak at CAD \$286.50 (split adjusted) in May 1996 on the Toronto Stock Exchange (TSE), with a total capitalization of over CAD \$6 billion. Bre-X Minerals collapsed in 1997 after the gold samples were found to be a fraud. By May, Bre-X faced a number of lawsuits and angry investors who had lost billions. Among the major losers were three Canadian public sector organizations: The Ontario Municipal Employees Retirement Board (loss of \$45 million), the Caisse de dépôt et placement du Québec, the Quebec Public Sector Pension fund (\$70 million), and the Ontario Teachers Pension Plan (\$100 million). In 1999 the Royal Canadian Mounted Police (RCMP) announced it was ending its investigation without laying criminal charges against anyone.</p> <p>David Walsh founded Bre-X Minerals Ltd. in 1989 as a subsidiary of Bresea Resources Ltd. The company did not make a significant profit before 1993, when Walsh followed the advice of geologist John Felderhof and bought a property in the middle of a jungle near the Busang River in Kalimantan, Indonesia. The first estimate of the site by its project manager (Filipino geologist Michael de Guzman) was approximately 2 million Troy ounces. The fraud began to unravel rapidly on March 19, 1997, when Filipino Bre-X geologist Michael de Guzman reportedly committed suicide by jumping from a helicopter in Busang, Indonesia. A body was found four days later in the jungle, missing the hands and feet, and with the penis "surgically removed". On the other hand the body was reportedly mostly eaten by animals and identified from molars and a thumbprint. (According to journalist John McBeth, a body had gone missing from the morgue of the town from which the helicopter flew. The remains of "de Guzman" were found only 400 metres from a logging road. No one saw the body except another Filipino geologist who claimed it was de Guzman. And one of the five women who considered themselves his wife was receiving monetary payments from somebody long after the supposed death of de Guzman. Walsh moved to the Bahamas in 1998, still professing his innocence. Two masked gunmen broke into his home in Nassau, tying him up, and threatened to shoot him unless he turned over all his money. The incident ended peacefully but three weeks later, on June 4, 1998, Walsh died of a brain aneurysm.</p>
Greater Ministries Scheme	<p>From 1993 until 1997, a church named Greater Ministries International in Tampa, Florida, headed by Gerald Payne bilked over 18,000 people out of \$500 million. Payne and other church elders promised the church members double their money back, citing Biblical scripture. However, nearly all the money was lost or hidden away. Church leaders received prison sentences ranging from 13 to 27 years.</p>
Albanian Ponzi Scheme	<p>In the mid-1990s, Albania was transitioning into a liberalized market economy after years under a State-controlled economy reinforced by the cult of personality involving longtime Communist leader Enver Hoxha; the rudimentary financial system became dominated by pyramid schemes, and government officials tacitly endorsed a series of pyramid investment funds. Many Albanians, approximately two-thirds of the population, invested in them. In 1997, Albanians, who had lost \$1.2 billion, took their protest to the streets where uncontrollable rioting and attacks on government infrastructure led to the</p>

	toppling of the government and the temporary existence of a stateless society. Although technically a Ponzi Scheme, the Albanian scams were commonly referred to as pyramid schemes both popularly and by the International Monetary Fund.
National Heritage Life Insurance Company Scheme	Sholam Weiss (also spelled Shalom Weiss; born April 1, 1954) is an American former businessman and convicted felon. In 2000, he was convicted of multiple fraud and money laundering counts and sentenced to 845 years in prison for looting the National Heritage Life Insurance Company of over \$450 million. It was believed to be the largest insurance failure in history at the time. The sentence imposed on Weiss is believed to be the longest known to have ever been imposed for a white-collar crime. It is also believed to be the longest criminal sentence ever imposed at the federal level in American history. Weiss was convicted of 78 counts including racketeering, wire fraud, and money laundering and ordered to pay \$125 million in restitution and \$123 million in penalties. About a dozen individuals were convicted for involvement in the collapse; another defendant, Keith Pound, received a 750-year sentence, and \$139 million in restitution. Pound died in prison in 2004 at age 51.
Slatkin Ponzi Scheme	From 1986 to 2001, Slatkin raised approximately \$593 million from about 800 wealthy investors. Using the funds from later investors, he paid one group of early investors \$279M on their original \$128M investment, citing investment success without actually making most of the claimed investments. He also distributed millions in fees to associates as "consultants". He successfully sustained the scheme until 2001, when it was shut down by an investigation by the U.S. Securities and Exchange Commission (SEC). Slatkin pleaded guilty to mail fraud, wire fraud, money laundering, and obstruction of justice and on September 2, 2003, he was sentenced to fourteen years in federal prison.
Dot-com Bubble	The dot-com bubble was a historic speculative bubble covering roughly 1995–2001 during which stock markets in industrialized nations saw their equity value rise rapidly from growth in the Internet sector and related fields. While the latter part was a boom and bust cycle, the Internet boom is sometimes meant to refer to the steady commercial growth of the Internet with the advent of the World Wide Web, as exemplified by the first release of the Mosaic web browser in 1993, and continuing through the 1990s. On March 10, 2000 the NASDAQ peaked at 5,132.52 intraday before closing at 5,048.62. Afterwards, the NASDAQ fell as much as 78%. The stock market crash of 2000–2002 caused the loss of \$5 trillion in the market value of companies from March 2000 to October 2002. As of September 24, 2002, the Dow Jones Industrial Average had lost 27% of the value it held on January 1, 2001: a total loss of 5 trillion dollars. The Dow Jones had already lost 9% of its peak value at the start of 2001, while the Nasdaq had lost 44%. At the March 2000 top, the sum in valuation of all NYSE-listed companies stood at \$12.9 trillion, and the valuation sum of all NASDAQ-listed companies stood at \$5.4 trillion, for a total market value of \$18.3 trillion. The NASDAQ subsequently lost nearly 80% and the S&P 500 lost 50% to reach the October 2002 lows. The total market value of NYSE (7.2) and NASDAQ (1.8) companies at that time was only \$9 trillion, for an overall market loss of \$9.3 trillion.
Haitian Ponzi Scheme	In 2001, the Haitian population fell prey to Ponzi schemers offering rates up to 15%. The outfits, called "cooperatives", appeared to be implicitly backed by the government and became wildly popular in the population at large, who felt safe since the co-ops were openly advertising in the radio and TV ads using Haitian pop stars as spokespeople. It is estimated that more than \$240 million was swindled from investors, equivalent to 60% of the country's government budget.
Enron Scandal	The Enron scandal, publicized in October 2001, eventually led to the bankruptcy of the Enron Corporation, an American energy company based in Houston, Texas, and the de facto dissolution of Arthur Andersen, which was one of the five largest audit and accountancy partnerships in the world. In addition to being the largest bankruptcy reorganization in American history at that time, Enron was cited as the biggest audit failure. Enron's shareholders lost \$74 billion in the four years before the company's bankruptcy (\$40 to \$45 billion was attributed to fraud). As Enron had nearly \$67 billion that it owed creditors, employees and shareholders received limited, if any, assistance aside from severance from Enron. To pay its creditors, Enron held auctions to sell assets including art, photographs, logo signs, and its pipelines. In May 2004, more than 20,000 of Enron's former employees won a suit of \$85 million for compensation of \$2 billion that was lost from their pensions. From the settlement, the employees each received about \$3,100. The next year, investors received another settlement from several banks of \$4.2 billion. In September 2008, a \$7.2-billion settlement from a \$40-billion lawsuit, was reached on behalf of the shareholders. The settlement was distributed among the main plaintiff, University of California (UC), and 1.5 million individuals and groups. UC's law firm Coughlin Stoia Geller Rudman and Robbins, received \$688 million in fees, the highest in a U.S. securities fraud case. Kenneth Lee Lay was the CEO and chairman of Enron Corporation. Lay was indicted by a grand jury and was found guilty of 10 counts of securities fraud. Lay died while vacationing, three months before his October 23 sentencing. A preliminary autopsy reported Lay had died of a heart attack caused by coronary artery disease and his conviction was vacated. Chase paid out over \$2 billion in fines and legal settlements for their role in financing Enron Corporation with aiding and abetting Enron Corp.'s securities fraud, which collapsed amid a financial scandal in 2001. In 2003, Chase paid \$160 million in fines and penalties to settle claims by the Securities and Exchange Commission and the Manhattan district attorney's office. In 2005, Chase paid \$2.2 billion to settle a lawsuit filed by investors in Enron.
WorldCom Scandal	Beginning modestly during mid-1999 and continuing at an accelerated pace through May 2002, the company—directed by Ebbers (as CEO), Scott Sullivan (CFO), David Myers (Controller), and Buford

	<p>"Buddy" Yates (Director of General Accounting)—used fraudulent accounting methods to disguise its decreasing earnings to maintain the price of WorldCom's stock. In 2002, a small team of internal auditors at WorldCom worked together, often at night and secretly, to investigate and reveal \$3.8 billion worth of fraud. Soon thereafter, the company's audit committee and board of directors were notified of the fraud and acted swiftly: Sullivan was dismissed, Myers resigned, Arthur Andersen withdrew its audit opinion for 2001, and the U.S. Securities and Exchange Commission (SEC) began an investigation into these matters on June 26, 2002 (see accounting scandal). By the end of 2003, it was estimated that the company's total assets had been inflated by about \$11 billion. This made the WorldCom scandal the largest accounting fraud in American history until the exposure of Bernard Madoff's \$64 billion Ponzi scheme in 2008. On March 15, 2005, Bernard Ebbers was found guilty of all charges and convicted of fraud, conspiracy and filing false documents with regulators — all related to the \$11 billion accounting scandal. On July 13, 2005, Bernard Ebbers received a sentence that would keep him imprisoned for 25 years. At time of sentencing, Ebbers was 63 years old.</p>
HealthSouth Accounting Scandal	<p>The first of HealthSouth's accounting problems surfaced in late 2002 after CEO Richard M. Scrushy sold \$75 million in stock several days before the company posted a large loss. HealthSouth was accused by the U.S. Securities and Exchange Commission (SEC) of an accounting scandal where the company's earnings were falsely inflated by \$1.4 billion. In 1996, Scrushy allegedly instructed the company's senior officers and accountants to falsify company earnings reports in order to meet investor expectations and control the price of the company's stock. The fraud continued for seven years. In certain fiscal years, the company's income was overstated by as much as 4700%. The \$1.4 billion represents more than 10% of the company's total assets. At one point, the company's corporate taxes—based on its fraudulent earnings—were higher than its actual earnings. In 1998, HealthSouth was accused of violation of the Securities Exchange Act by failing to disclose negative trends and misrepresenting company's financial information.</p> <p>In March 2003, HealthSouth's CEO Richard M. Scrushy was charged with the accounting fraud and the SEC announced it was investigating whether Scrushy's stock sell was related to HealthSouth posting a large loss. HealthSouth hired an outside law firm to review Scrushy's stock sale, with the firm concluding that the sale and profit loss were not related, although this did not take the company off the SEC's radar. On the evening of March 18, 2003 FBI agents executed search warrants at the company's headquarters after the company's Chief Financial Officer William Owens agreed to wear a wire in a failed attempt to get Scrushy to talk about the fraud. In June 2005, Scrushy was acquitted on all 36 of the accounting fraud counts against him, most notably one count in violation of the Sarbanes-Oxley Act. However, four years later, he was sued for fraud by HealthSouth investors and ordered to repay his company \$2.8 billion.</p>
Bre-X Gold Scheme	<p>Bre-X was a group of companies in Canada. Bre-X Minerals Ltd., a major part of Bre-X based in Calgary, was involved in a major gold mining scandal when it reported it was sitting on an enormous gold deposit at Busang, Indonesia (in Borneo). Bre-X bought the Busang site in March 1993 and in October 1995 announced significant amounts of gold had been discovered, sending its stock price soaring. Originally a penny stock, its stock price reached a peak at CAD \$286.50 (split adjusted) in May 1996 on the Toronto Stock Exchange (TSE), with a total capitalization of over CAD \$6 billion. Bre-X Minerals collapsed in 1997 after the gold samples were found to be a fraud.</p> <p>By May, Bre-X faced a number of lawsuits and angry investors who had lost billions. Among the major losers were three Canadian public sector organizations: The Ontario Municipal Employees Retirement Board (loss of \$45 million), the Caisse de dépôt et placement du Québec, the Quebec Public Sector Pension fund (\$70 million), and the Ontario Teachers Pension Plan (\$100 million). There was fallout in the Canadian financial sector also; the fraud proved a major embarrassment for Peter Munk, the head of Barrick Gold, as well as for the then-head of the Toronto Stock Exchange (resulting in his ousting by 1999), and began a tumultuous realignment of the Canadian stock exchanges.</p> <p>Walsh moved to the Bahamas in 1998, still professing his innocence. Two masked gunmen broke into his home in Nassau, tying him up, and threatened to shoot him unless he turned over all his money. The incident ended peacefully but three weeks later, on June 4, 1998, Walsh died of a brain aneurysm. In 1999 the Royal Canadian Mounted Police (RCMP) announced it was ending its investigation without laying criminal charges against anyone. Critics charged that the RCMP was underfunded and understaffed to handle complex criminal fraud cases, and also charged that Canadian laws in this area were inadequate. However, despite the dropping of criminal charges, civil class action suits against Bre-X directors, advising financial firms and Kilborn continued. Bre-X went bankrupt November 5, 1997 although some of its subsidiaries like Bro-X continued until 2003. In May 1999, the Ontario Securities Commission charged Felderhof with insider trading. No other member of Bre-X's board of directors, or others associated with the Busang project, were charged by the OSC. The OSC admitted that there is no evidence that Felderhof was either involved in the fraud or was aware of the fraud.</p>
Mutual Benefit Life Insurance Company Ponzi	<p>From 1994 to May 2004, Mutual Benefit Life Insurance Company purchased life insurance policies from the elderly and persons suffering from AIDS and other chronic illnesses which they then sold</p>

Scheme	fractionalized interests in insurance policy death benefits, known as “viatical settlements,” to 30,000 investors scamming more than \$837 million. Mastermind lawyer Anthony Livoti was sentenced to 10 years in prison and ordered to pay over \$800 million in restitution to victims.
2000s Energy Crisis	From the mid-1980s to September 2003, the inflation-adjusted price of a barrel of crude oil on NYMEX was generally under US\$25/barrel. During 2003, the price rose above \$30, reached \$60 by 11 August 2005, and peaked at \$147.30 in July 2008. During this timeframe in 2005, ExxonMobil surpassed Wal-Mart as the world's largest publicly held corporation when measured by revenue, although Wal-Mart remained the largest by number of employees. ExxonMobil's \$340 billion revenues in 2005 were a 25.5 percent increase over their 2004 revenues. In 2006, Wal-Mart recaptured the lead with revenues of \$348.7 billion against ExxonMobil's \$335.1. ExxonMobil continued to lead the world in both profits (\$39.5 billion in 2006) and market value (\$460.43 billion). In 2007, ExxonMobil had a record net income of \$40.61 billion on \$404.552 billion of revenue, an increase largely due to escalating oil prices as their actual BOE production decreased by 1 percent, in part due to expropriation of their Venezuelan assets by the Chávez government. As of December 2013, ExxonMobil occupied five out of ten slots for Largest Corporate Annual Earnings of All Time and two out of ten on Largest Corporate Quarterly Earnings.
James Paul Lewis Jr.	In May 2006, James Paul Lewis, Jr. was sentenced to 30 years in federal prison for running a \$311 million Ponzi scheme over a 20-year period. He operated under the name Financial Advisory Consultants from Lake Forest, California.
Chinese Ant Farms Scheme	More than 1 million Chinese people lost over \$1.2 billion in a scheme involving ant farming. The Yilishen Tianxi Group was a Chinese company established in 1999 which sold traditional Chinese medicine products made from ants. People invested money in the company, purchasing and raising boxes of ants with the promise that they could sell the ants back for a profit, before it was exposed as a ponzi scheme in 2007. In February 2008, another man was sentenced to death in the same province of China after defrauding investors of three billion yuan (US\$417 million) in a similar ant-breeding scheme.
Lou Pearlman	On June 27, 2007, former boy band mogul Lou Pearlman was indicted by a grand jury on several counts of fraud and money laundering which for running a \$500 million Ponzi scheme over 20 years; he pleaded guilty and was sentenced to 25 years imprisonment. Pearlman died while still in custody at the Federal Correctional Institution in Miami, Florida, on August 19, 2016 from cardiac arrest; he was 62 years old.
The Financial Crisis of 2007–2008	The financial crisis of 2007–2008, also known as the global financial crisis and the 2008 financial crisis, is considered by many economists to have been the worst financial crisis since the Great Depression of the 1930s. It began in 2007 with a crisis in the subprime mortgage market in the USA, and developed into a full-blown international banking crisis with the collapse of the investment bank Lehman Brothers on September 15, 2008. Excessive risk taking by banks such as Lehman Brothers helped to magnify the financial impact globally. Massive bail-outs of financial institutions and other palliative monetary and fiscal policies were employed to prevent a possible collapse of the world's financial system. The crisis was nonetheless followed by a global economic downturn, the Great Recession. The European debt crisis, a crisis in the banking system of the European countries using the euro, followed later. The US Senate's Levin–Coburn Report concluded that the crisis was the result of "high risk, complex financial products; undisclosed conflicts of interest; the failure of regulators, the credit rating agencies, and the market itself to rein in the excesses of Wall Street." There is a direct relationship between declines in wealth and declines in consumption and business investment, which along with government spending, represent the economic engine. Between June 2007 and November 2008, Americans lost an estimated average of more than a quarter of their collective net worth. By early November 2008, a broad US stock index the S&P 500, was down 45% from its 2007 high. Housing prices had dropped 20% from their 2006 peak, with futures markets signaling a 30–35% potential drop. Total home equity in the United States, which was valued at \$13 trillion at its peak in 2006, had dropped to \$8.8 trillion by mid-2008 and was still falling in late 2008. Total retirement assets, Americans' second-largest household asset, dropped by 22%, from \$10.3 trillion in 2006 to \$8 trillion in mid-2008. During the same period, savings and investment assets (apart from retirement savings) lost \$1.2 trillion and pension assets lost \$1.3 trillion. Taken together, these losses total a staggering \$8.3 trillion. Since peaking in the second quarter of 2007, household wealth is down \$14 trillion. Further, US homeowners had extracted significant equity in their homes in the years leading up to the crisis, which they could no longer do once housing prices collapsed. Free cash used by consumers from home equity extraction doubled from \$627 billion in 2001 to \$1,428 billion in 2005 as the housing bubble built, a total of nearly \$5 trillion over the period. US home mortgage debt relative to GDP increased from an average of 46% during the 1990s to 73% during 2008, reaching \$10.5 trillion. On February 9, 2012, it was announced that the five largest mortgage servicers (Ally/GMAC, Bank of America, Citi, JPMorgan Chase, and Wells Fargo) agreed to a historic settlement with the federal government and 49 states. The settlement, known as the National Mortgage Settlement (NMS), required the servicers to provide about \$26 billion in relief to distressed homeowners and in direct payments to the states and federal government. This settlement amount makes the NMS the second largest civil settlement in U.S. history, only trailing the Tobacco Master Settlement Agreement. The five banks were also required to comply with 305 new mortgage servicing standards. Oklahoma

	<p>held out and agreed to settle with the banks separately. During the 2007 subprime mortgage crisis, Goldman was able to profit from the collapse in subprime mortgage bonds in the summer of 2007 by short-selling subprime mortgage-backed securities. Two Goldman traders, Michael Swenson and Josh Birnbaum, are credited with being responsible for the firm's large profits during the crisis. The pair, members of Goldman's structured products group in New York, made a profit of \$4 billion by "betting" on a collapse in the sub-prime market, and shorting mortgage-related securities. By summer 2007, they persuaded colleagues to see their point of view and convinced skeptical risk management executives. The firm initially avoided large subprime writedowns, and achieved a net profit due to significant losses on non-prime securitized loans being offset by gains on short mortgage positions. The firm's viability was later called into question as the crisis intensified in September 2008. Gary D. Cohn who was President and Co-Chief Operating Officer and director of Goldman Sachs at the time went on to become the chief economic advisor to President Donald Trump and Director of the National Economic Council.</p>
Washington Mutual Inc.	<p>Washington Mutual, Inc., abbreviated to WaMu, was a savings bank holding company and the former owner of Washington Mutual Bank, which was the United States' largest savings and loan association until its collapse in 2008. All assets but only some liabilities (including deposits, covered bonds, and other secured debt) of Washington Mutual Bank were assumed by JPMorgan Chase. Under the deal, JPMorgan Chase acquired all the banking operations of WaMu, including \$307 billion in assets and \$188 billion in deposits, for a price of \$1.9 billion plus debt assumptions.</p>
Tom Petters	<p>On December 1, 2008, in Saint Cloud, Minnesota, celebrity businessman Tom Petters was charged by the Federal government as the mastermind behind a \$3.65 billion Ponzi scheme that bilked investors over a 13-year period. Petters lived an extravagant lifestyle supported by his Ponzi scheme. Petters faced 20 counts of wire and mail fraud, conspiracy, and money laundering for the alleged investment scheme that ran from 1995 through September 2008. He is expected to plead not guilty, but his co-conspirators in the Ponzi scheme, Deanna Coleman, Robert White, Michael Catain, and Larry Reynolds, have all pleaded guilty. The Petters Ponzi scheme came to an end when Petters' top co-conspirator Deanna Coleman turned government informant and wore a wire. Petters and the others were planning to flee to countries without extradition agreements with the U.S. Deanna Coleman and Michael Catain had properties in Costa Rica. On December 2, 2009, Tom Petters was found guilty in the U.S. District Court in St. Paul, Minnesota on 20 counts of wire and mail fraud. The US federal government is now seeking forfeiture of all Petters' assets. He later was convicted for turning Petters Group Worldwide into a \$3.65 billion Ponzi scheme and was sentenced to 50 years in federal prison. Reporters from the Minneapolis Star Tribune stated that it is extremely unlikely that Petters will ever again live as a free citizen.</p>
Stanford Ponzi Scheme	<p>Robert Allen Stanford is an American former financier and sponsor of professional sports who is serving a 110-year federal prison sentence, having been convicted of charges that his investment company was a massive Ponzi scheme and fraud. Stanford was the chairman of the now defunct Stanford Financial Group of Companies. A fifth-generation Texan who once resided in Saint Croix, U.S. Virgin Islands, he holds dual citizenship, being a citizen of Antigua and Barbuda and the United States. He contributed millions of dollars to politicians in both Antigua and the United States amongst other countries.</p> <p>In early 2009, Stanford became the subject of several fraud investigations, and on February 17, 2009, was charged by the U.S. Securities and Exchange Commission (SEC) with fraud and multiple violations of U.S. securities laws for alleged "massive ongoing fraud" involving \$7 billion in certificates of deposits. The Federal Bureau of Investigation (FBI) raided Stanford's offices in Houston, Texas; Memphis, Tennessee; and Tupelo, Mississippi. On February 27, 2009, the SEC amended its complaint to describe the alleged fraud as a "massive Ponzi scheme". He "voluntarily surrendered" to authorities on June 18, 2009. On March 6, 2012, Stanford was convicted on all charges except a single count of wire fraud. He is serving his 110-year sentence at United States Penitentiary, Coleman in Coleman, Florida. In September 2014, Stanford appealed his conviction; however, the appeals court rejected the appeal in October 2015.</p>
Madoff Ponzi Scheme	<p>Bernard Lawrence "Bernie" Madoff is an American fraudster and a former stockbroker, investment advisor, and financier. He is the former non-executive chairman of the NASDAQ stock market, and the admitted operator of a Ponzi scheme that is considered the largest financial fraud in U.S. history. He employed at the firm his brother Peter, as senior managing director and chief compliance officer; Peter's daughter Shana Madoff, as the firm's rules and compliance officer and attorney; and his sons Andrew and Mark. Peter has since been sentenced to 10 years in prison and Mark committed suicide by hanging exactly two years after his father's arrest. Andrew died of lymphoma on September 3, 2014. The Madoff investment scandal defrauded thousands of investors of billions of dollars. Madoff said he began the Ponzi scheme in the early 1990s. However, federal investigators believe the fraud began as early as the mid-1980s and may have begun as far back as the 1970s. Those charged with recovering the missing money believe the investment operation may never have been legitimate. The amount missing from client accounts, including fabricated gains, was almost \$65 billion. The Securities Investor Protection Corporation (SIPC) trustee estimated actual losses to investors of \$18 billion. On June 29, 2009, Madoff was sentenced to 150 years in prison, the maximum allowed. Madoff's right-hand man and financial chief, Frank DiPascali, pleaded guilty to 10 federal charges in 2009 and (like Friehling) testified for the government at the trial of five former colleagues, all of whom were convicted. DiPascali faced a</p>

	<p>sentence of up to 125 years, but he died of lung cancer in May 2015, before he could be sentenced. In the fall of 2013, JPMorgan began talks with prosecutors and regulators regarding compliance with anti-money-laundering and know-your-customer banking regulations in connection with Madoff. On January 7, 2014, JPMorgan agreed to pay a total of \$2.05 billion in fines and penalties to settle civil and criminal charges related to its role in the Madoff scandal. The government filed a two-count criminal information charging JPMorgan with Bank Secrecy Act violations, but the charges will be dismissed within two years provided that JPMorgan reforms its anti-money laundering procedures and cooperates with the government in its investigation. The bank agreed to forfeit \$1.7 billion. The lawsuit, which was filed on behalf of shareholders against Chief Executive Jamie Dimon and other high-ranking JPMorgan employees, used statements made by Bernie Madoff during interviews conducted while in prison in Butner, North Carolina claiming that JPMorgan officials knew of the fraud. The lawsuit stated that, "JPMorgan was uniquely positioned for 20 years to see Madoff's crimes and put a stop to them ... But faced with the prospect of shutting down Madoff's account and losing lucrative profits, JPMorgan - at its highest level - chose to turn a blind eye." JPMorgan also agreed to pay a \$350 million fine to the Office of the Comptroller of the Currency and settle the suit filed against it by Picard for \$543 million.</p>
Nicholas Cosmo	<p>On January 26, 2009, Nicholas Cosmo, founder of Agape World, surrendered to federal authorities in connection with a suspected \$380 million Ponzi scheme. Previously convicted of fraud in 1999, Cosmo surrendered at the Long Island Railroad train station in Hicksville, N.Y. and was sentenced to 50 years imprisonment. In March 2009, a lawsuit was filed in New York against Bank of America, one of the largest banks in the United States, that claimed that Bank of America "established, equipped and staffed" a branch office in the headquarters of Mr. Cosmo's firm, Agape Merchant Advance. As a result, the lawsuit contends that the bank knowingly "assisted, facilitated and furthered" Mr. Cosmo's fraudulent scheme.</p>
Dreier, LLP Ponzi Scheme	<p>Marc Stuart Dreier is a former American lawyer who was sentenced to 20 years in federal prison in 2009 for committing investment fraud using a Ponzi scheme. He is scheduled to be released from FCI Sandstone on October 26, 2026. On May 11, 2009, he pleaded guilty in the United States District Court for the Southern District of New York to eight charges of fraud, which included one count of conspiracy to commit securities fraud and wire fraud, one count of money laundering, one count of securities fraud, and five counts of wire fraud in a scheme to sell \$700 million in fictitious promissory notes. Civil charges, filed in December 2008 by the U.S. Securities and Exchange Commission, are pending.</p>
Troy Wragg and Amanda Knorr	<p>On November 16, 2009, the SEC charged four individuals and two companies for perpetrating a Ponzi scheme to defraud over 300 investors of \$30 million. Pennsylvania-based Mantria Corporation, run by executives Troy Wragg and Amanda Knorr, supposedly focused on green initiatives such as a "carbon negative" housing community in Tennessee and an organic waste-derived "biochar" charcoal substitute production plant. Between September 2007 through November 2009, Mantria Corporation raised funds through Denver-based Speed of Wealth LLC, run by Wayde and Donna McKelvy. The SEC alleged that Mantria and Speed of Wealth exaggerated the scope and success of Mantria's operations. Subsequent charges estimate Mantria and Speed of Wealth raised \$54 million, of which they paid \$17.5 million to investors, using investors' own funds to pay those returns.</p>
Scott W. Rothstein	<p>Scott W. Rothstein, a disbarred lawyer and the former managing shareholder, chairman, and chief executive officer of the now-defunct Rothstein Rosenfeldt Adler law firm was accused of funding his philanthropy, political contributions, law firm salaries, and an extravagant lifestyle with a massive \$1.4 billion Ponzi scheme. Scott Rothstein turned himself in to federal authorities and was subsequently arrested on charges related to the Racketeer Influenced and Corrupt Organizations Act (RICO). Rothstein was denied bond by U.S. Magistrate Judge Robin Rosenbaum, who ruled that due to his ability to forge documents, he was considered a flight risk. Although his arraignment plea was not guilty, Rothstein cooperated with the Government and reversed his plea to guilty of five federal crimes on January 27, 2010. He was sentenced to 50 years, despite the prosecution asking for 40 years.</p>
Nevin Shapiro	<p>On September 15, 2010, Nevin Shapiro pleaded guilty to a 2005–2009 Ponzi scheme in a Newark, New Jersey court. The scheme brought in approximately \$880 million. Headquartered in Miami, the scheme was based on an import/export grocery business but was diverting investments to attract new investors. Among the items seized as a result of his plea were a \$5 million Miami mansion and a yacht. He was known as "Lil Luke" because of his relationship with the Miami Hurricanes football team. This was a tribute to Luther Campbell, a famous former Hurricanes booster. On August 16, 2011, in a story broken by Yahoo! Sports, Shapiro stated that his support of the team included cash, entertainment, prostitutes, and gifts, all against NCAA rules.</p>
Zeek Rewards	<p>On August 17, 2012, the SEC filed a federal case against defendants Paul Burks and Zeek Rewards, based out of North Carolina. Paul Burks ran the entity of Zeek Rewards, a fraudulent investment opportunity that promised investors returns as high as 1.5% per day by sharing in the profits of Zeekler, a penny auction. Investors were encouraged to recruit new members to increase their returns. New investors had to pay a monthly "subscription" of up to \$99/month and an initial investment of up to \$10,000. The higher the initial investment, the higher the returns appeared. The Zeekler entity was an online penny auction that served as a front for the Zeek Rewards entity. Investors in the Zeek Rewards scheme were promised payouts from the profits made on Zeekler by recruiting new members and giving out "bids" that customers would use on the penny auction. While the Zeekler website did bring in</p>

	revenue, it was only about 1% of what investors believed was being brought into the Zeek Rewards company. The vast majority of dispersed funds were paid out from newly recruited investors. It is believed that the Ponzi scheme was a \$600,000,000 enterprise and the number of affected investors was 1,000,000 when the SEC filed suit. This made Zeek Rewards the largest ponzi scheme in history by number of affected investors, even though numerous other ponzi schemes have had larger enterprise values. Paul Burks paid \$4M to the SEC and agreed to cooperate. It remains unknown how much, if any, of the funds lost in the scheme will be returned to affected investors, as of August 2012.
2015–16 stock market selloff	The Dow Jones fell 888 points during a two-day period, 1300 points from August 18–21. On Monday, August 24, world stock markets were down substantially, wiping out all gains made in 2015, with interlinked drops in commodities such as oil, which hit a six-year price low, copper, and most of Asian currencies, but the Japanese yen, losing value against the United States dollar. With this plunge, an estimated ten trillion dollars had been wiped off the books on global markets since June.
Aftermath of the United Kingdom European Union membership referendum, 2016	World Markets tumble after the United Kingdom voted to leave the European Union. Investors lost more than the equivalent of 2 trillion United States dollars on 24 June 2016, making this day the worst single day drop in history, in absolute terms, according to data from S&P Global. The losses were extended to a combined total of the equivalent of 3 trillion dollars by additional selling on 27 June 2016 according to data from S&P Global.
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Where did all the money from these financial fiascos go, the trillions of dollars stolen from millions of hard-working victims who were sold lies? How many billions of dollars has been stolen by others who misled investors in similar legal pyramid, get-rich-quick, or other Ponzi type schemes? Why do so few of those actually responsible get prosecuted for their blatant criminal actions towards so many? Why do so many corporate wrongdoers get massive multi-million-dollar payouts and severance packages when they commit unethical and criminal acts, while also usually avoiding any prosecution by the law or receive an extremely light sentence for their acts? How many of those responsible are still spending the money they stole? Why are corporations and the corrupt individuals running them, which have a known history of fraud, allowed to simply pay a fine and/or settle a lawsuit and then continue doing business as usual only to repeat a similar criminal action later? Why has America had a continuous economic boom and bust history since 1929? How can a few be allowed to so easily rob nearly the whole society and get away with it? The PBS frontline reports: *'Inside the Meltdown'* February 17, 2009, *'Ten Trillion and Counting'* March 24, 2009, *'Breaking the Bank'* June 16, 2009, *'Money, Power, and Wall Street'* April 24, 2012, *'The Untouchables'* January 22, 2013, and *'Black Money'* April 7, 2009 all focus on the recent financial fiascos which were caused by corporate greed combined with lax oversight and regulations. And Mark Archbar's 2003 documentary *'The Corporation'* gives a detailed history of corporations.

These financial fiascos are constant reminders that the capitalist monetary system can be manipulated by the greedy, and that it will always need strict government regulations and oversight, not less, if it is to ever be a successful system. Between the financial crises and the rising global food prices it shows how easily manipulated the monetary system is by the few while controlling the basic necessities in life of the majority. Why are exorbitant profits allowed to be made on things which are vital to life and a functioning society like medicine, food, water, shelter, electricity, Internet, waste removal, etc.? When corporations begin charging so much for the necessities in life, and *Homo sapiens* and the Earth itself is suffering as a result, shouldn't the government intervene to protect citizens and the environment? If corporations don't want to offer these basic services to citizens for a reasonable amount of money, then why can't the government offer them instead as it has in the past before it began outsourcing nearly everything to independent contractors, often times with little to no oversight? How can food speculation be allowed in financial markets when it could cause price swings in staple foods like wheat, maize, and soy? How much better would the world function without a focus on money and profits? Couldn't all consumers have the same products and quality services which are only available to the few? The same quality housing? Is this Utopian future even remotely possible? Perhaps it would look something like a science-fiction movie, all the *Homo sapiens* are dressed nearly identical, they live in nearly identical skyscrapers, food, medicine, and shelter are freely available to all *Homo sapiens*, with almost all tasks being automated and done by robots allowing *Homo sapiens* to devote their work hours towards fields they have a talent or interest in, and they are motivated by knowledge and discovery, not money and profit. Perhaps *Homo sapiens* will revert back to a barter system which is prevalent in many traditional societies even today and has found renewed use on the Internet. What would happen if consumers stopped consuming as much, would the world economy collapse or just shrink? Would the world just have a surplus of products like many Western

countries have now? What would happen if businesses simply broke even, instead of making exorbitant profits from marking up the cost of commodities and other goods that only cost a small fraction of the profits to manufacture? Why can't a business break even and make no profit, every employee being paid a good salary based on performance, and not a pay scale based on irrelevant education, seniority, gender, or other favoritism?

Warmongers

Society has experienced peace and war transitioning from one to the other throughout the history of civilization, and in nearly every society during one time or another there have always been warmongers who cause this instability in their attempts to suppress, manipulate, and rule the world. Until the establishment of true democracy in modern times, the entire history of major large civilizations has been mainly based on aristocracy, monarchy, oligarchy, theocracy, communism, or fascism type system of rule, be it the Mayan, Aztec, Asian, Egyptian, Greek, Hun, Roman, USSR, Nazi, or other. And no matter the title be it an emperor, czar, king, dictator, sultan, or puppet government, the few and powerful with the largest military have always attempted to rule the world by sovereign means, many of them while under the delusion of being in power as an instrument of God. And as history has shown they have done nothing but destroy the civilized world with their actions, ultimately hindering the progress of *Homo sapiens* as a whole, because to a despot human life is cheap. War never stops if madmen have power and are in control, it only pauses to wait for new victims. Stop giving the madmen power and the tools with which to wage war, and wars will end. Albert Einstein made the following remarks about war,

"For force always attracts men of low morality, and I believe it to be an invariable rule that tyrants of genius are succeeded by scoundrels."

"This topic brings me to that worst outcrop of herd life, the military system, which I abhor. That a man can take pleasure in marching in fours to the strains of a band is enough to make me despise him. He has only been given his big brain by mistake; unprotected spinal marrow was all he needed. This plaguespot of civilization ought to be abolished with all possible speed. Heroism on command, senseless violence, and all the loathsome nonsense that goes by the name of patriotism-how passionately I hate them! How vile and despicable seems war to me! I would rather be hacked in pieces than take part in such an abominable business. My opinion of the human race is high enough that I believe this bogey would have disappeared long ago, had the sound sense of the peoples not been systematically corrupted by commercial and political interests acting through the schools and the Press." (52)

"In two weeks the sheep like masses of any country can be worked up by the newspapers into such a state of excited fury that men are prepared to put on uniforms and kill and be killed, for the sake of the sordid ends of a few interested parties. Compulsory military service seems to me the most disgraceful symptom of that deficiency in personal dignity from which civilized mankind is suffering today." (56)

"One has to realize that the powerful industrial groups concerned in the manufacture of arms are doing their best in all countries to prevent the peaceful settlement of international disputes, and that rulers can only achieve this great end if they are sure of the vigorous support of the majority of their people."

"The armament industry is indeed one of the greatest dangers that beset mankind. It is the hidden evil power behind the nationalism which is rampant everywhere..."

"And those who have an interest in keeping the machinery of war going are a very powerful body; they will stop at nothing to make public opinion subservient to their murderous ends." (62)

Homo sapiens have had a history of either wanting to assimilate, change, or obliterate things it does not fully understand. Based on 2010 data from the Political Instability Task Force, there have been at least 43 genocides since 1956 which resulted in the deaths of at least 50,000,000 *Homo sapiens*. One can still see the scars left behind by the meaningless conquests of the few greedy tyrants for power over the world which would never fully submit. How many millions of ignorant *Homo sapiens* were led to their deaths having followed war mongering idiots who convinced them to fight for a futile senseless cause, be it a pseudo religion, political views, hate, greed, revenge, or other worthless purpose? Why do the modern-day politicians and military leaders who declare war never actually fight during the war, they only lead others to their death? How could a war be fought if everyone refused to fight and no one took part in any battles? What does it say when a government must enact a policy of conscription in order to obtain soldiers to wage its war? Each day 18 to 22 American

veterans commit suicide, what does this say about the mental consequences of war on the soldiers who fight in these wars? (182)

One could argue that Americans have always had a military mentality from the conquering and assimilation of the indigenous, to the controversial claims made on the western states with Mexico. But the true modern-day American military mentality came as a result of World War II, and it has persisted and grown even more powerful over time into the Korean, Vietnam, Iraq, and Afghanistan wars, while continually being justified as an act done to preserve America's freedom, and labeling it a '*a cold war*', '*the war against communism*', or '*the war on terrorism*'. Albert Einstein described the American military mentality in saying,

"The tendencies we have mentioned are something new for America. They arose when, under the influence of the two World Wars and the consequent concentration of all forces on a military goal, a predominantly military mentality developed, which with the almost sudden victory became even more accentuated. The characteristic feature of this mentality is that people place the importance of what Bertrand Russell so tellingly terms "naked power" far above all other factors which affect the relations between peoples. The Germans, misled by Bismarck's successes in particular, underwent just such a transformation of their mentality-in consequence of which they were entirely ruined in less than a hundred years."

"Instead, the military mentality raises "naked power" as a goal in itself one of the strangest illusions to which men can succumb." (63)

2017 United States Military Spending Compared with other Agencies	
Dept. of Defense and Dept of Veterans Affairs	\$302,622,745,563
Dept. of Agriculture	\$37,255,552,970
Dept. of Education	\$60,762,568,254
Dept. of Housing and Urban Development	\$34,018,548,449
Dept. of Energy	\$23,477,536,922
National Aeronautics and Space Administration	\$14,641,116,354
U.S. Agency for International Development	\$9,842,873,524
Department of Labor	\$7,737,949,101
Dept. of the Interior	\$5,196,135,916
National Science Foundation	\$3,208,405,889
Environmental Protection Agency	\$1,557,851,075
Millennium Challenge Corporation	\$768,570,743
National Foundation on the Arts and the Humanities	\$518,981,004
Smithsonian Institution	\$140,373,370
SOURCE: www.USAspending.gov	

In 2016, the total world military expenditures were \$1,686,000,000,000 with the top 5 countries spending 2/3 of the total, and the United States alone spending 1/3 of the total at \$611,000,000,000. The remaining 4 countries were: China \$215,000,000,000 - Russia \$69,200,000,000 - Saudi Arabia \$63,700,000,000 - and India \$55,900,000,000. (432) Would it not be more logical to spend this money on education, environmental protection, science, and humanitarian assistance instead of war, destruction, and excessive unnecessary preparedness? If the United States spent even half of what it does for defense and war on international development and humanitarian assistance instead, would it not be viewed as more of a compassionate nation instead of a warmongering and destructive one who polices the world? Martin Luther King Jr. wrote,

"One day we must come to see that peace is not merely a distant goal that we seek but a means by which we arrive at that goal. We must pursue peaceful ends through peaceful means. How much longer must we play at deadly war games before we heed the plaintive plea of the unnumbered dead and maimed of past wars?...Wisdom born out of experience should tell us that war is obsolete."

“Therefore I suggest that the philosophy and strategy of nonviolence become immediately a subject for study and for serious experimentation in every field of human conflict, by no means excluding the relations between nations. It is, after all, nation-states which make war, which have produced the weapons that threaten the survival of mankind and which are both genocidal and suicidal in character.”

“It is not enough to say, “We must not wage war.” It is necessary to love peace and sacrifice for it. We must concentrate not merely on the eradication of war but on the affirmation of peace.” (230)

From Ahimsa to Martin Luther King Jr., the anti-war and anti-violence message has existed for thousands of years, but it is perhaps more prevalent and popular now than at any other point during history. And while wars and violent conflicts are fewer than in centuries past, the many antiwar and protest songs that Phil Ochs wrote and sang 50 years ago are still very relevant today, along with similar antiwar messages reiterated in other songs like: John Lennon's *'Imagine'*, The Plastic Ono Band's *'Give Peace a Chance'*, Edwin Star's *'War'*, Rage Against the Machine's *'Bulls on Parade'*, *'Zombie'* by: The Cranberries, Paul McCartney's *'Pipes of Peace'*, Black Sabbath's *'War Pigs'*, Marvin Gaye's *'What's Going On'*, Bob Dylan's *'Masters of War'*, Metallica's *'One'*, Pink Floyd's *'The Dogs of War'*, several songs by The Clash, Bob Marley's *'No More Trouble'*, *'Peace Train'* by: Cat Stevens, and a few hundred others. There are numerous antiwar literary works from early Greek works like Aristophanes's comedy *'Lysistrata'*, to Emery Reves's 1945 book *'The Anatomy of Peace'* and Smedley Butler's 1935 war profiteering exposé *'War is a Racket'*. There are even thousands of movies and other media promoting peace and love, but it is too often overshadowed by the overwhelming amount of media which encourages war and violence. War is promoted, glamorized, and glorified in movies, games, and other entertainment, children's toys represent the tools of war while children are encouraged from an early age to accept war as just another part of life and something to have fun with. Entertainment and even the mainstream news media very rarely, if at all, show the actual reality or the consequences of war, the dead bodies, injured civilians, the chaos, and destruction. Instead war is often shown as a glamorous explosion or a bloody fight in which no one is injured, and everything is alright in the end, and if someone does die it is usually the bad guy who deserved it or the hero who died trying to save the world, and to whom everyone should now look up to and try to be more like. The mainstream news media too often shows the acts of war from afar on a point of view camera attached to the bomb itself or from a camera attached to the aircraft dropping the bomb, but rarely if ever is the real aftermath shown up close and in detail. The United States Armed Forces award various medals, service ribbons, and badges for a wide range of things, but it is in effect an award system based in part on violence, destruction, and death. Yearly holidays remind the world of the past wars, and war is memorialized with monuments and in museums showing the tools of war as amazing, awe-inspiring, and something to be cherished. Why are there so many monuments memorializing war, violence, and destruction while so few are dedicated to peace, non-violence, and love? Ina Corrine Brown wrote,

“We award metals to the men who are most successful in killing enemies in wartime and we honor the dead who lose their own lives in an effort to take the lives of their adversaries. Thus in one set of circumstances, the man who takes a life is a criminal but in a different set of circumstances he is a hero. There are many peoples in the world to whom these particular distinctions are utterly meaningless. Some Eskimos, who readily justified one man's killing another in a quarrel and who considered it a duty to end the lives of one's aged and infirm parents, found it impossible to conceive of wars between villages and tribes. When a European tried to explain to a Melanesian cannibal the large number of casualties in World War I, the cannibal was completely bewildered to learn that the armies fought to kill but that neither side ate the victims-to him, it was both immoral and stupidly wasteful to kill more people than you could or would eat.” (25)

It isn't considered a war crime when a civilian is killed as a result of war, it is considered by those waging the war as just collateral damage. Incidents like the infamous *'2007 Collateral Murder'* are considered by the military to be nothing more than accidental mistakes of war and just an inevitable part of war, while justice is never served in incidents like the *'Mai Lai Massacre'*. Since recorded history, an estimated 315,232,919 to 754,733,827 *Homo sapiens* have died as a result of all the wars ever fought. (130) UNICEF reports that tens of thousands of children are recruited and used as soldiers in armed conflicts around the world, some of them as young as 8 years old. (265) How many millions of children through either brainwashing or use of force, have fought and died in all the wars over the last 5,000 years? Wars are now fought on a much smaller scale than in the past which involved military superpowers marching millions of soldiers to their deaths. Today's military uses technological weapons to kill their enemies in silence from afar without any warning, and like all weapons of

war do, with no regard if the final target also includes innocent civilians. Since World War II, most military conflicts have been called '*police actions*', and with no formal declaration of war proxy wars have also become far more common and are sometimes fought for decades. These new wars are funded by world superpowers which use other nations like the chessboard in which to play their deadly and destructive game of war. Between 1991 and 2017 the United States and British military forces launched 2,217 Tomahawk cruise missiles, all without warning and with little regard for innocent civilians.

By operating more than 100 black site prisons in 28 countries since the War on Terror began in 2001, the United States has circumvented the Geneva Conventions of 1949, War Crimes Act of 1996, the 1984 UN Convention against Torture, and other international laws regarding torture and how prisoners of war are treated. The Central Intelligence Agency (CIA), the Defense Intelligence Agency (DIA), and various divisions of the U.S. Armed Forces engaged in a program of systematic torture called '*Enhanced Interrogation Techniques*'. Methods of interrogation included: beating, binding in contorted stress positions, hooding, subjection to deafening noise, sleep deprivation to the point of hallucination, deprivation of food and drink, withholding medical care for wounds, waterboarding, walling, sexual humiliation, subjection to extreme heat or extreme cold, confinement in small coffin-like boxes, and repeated slapping. In 2010, it was estimated there were 26,000 prisoners being held at black site prisons, with most of the terrorist, or enemy combatants as they are labeled, being detained indefinitely without due process. Since 2002, Guantanamo Bay Detention Camp has served as a primary detention facility, or military prison, where prisoners of the War on Terror have been severely tortured while a world is forced to watch from afar. The Obama administration reduced the number of inmates at Guantanamo Bay to 41 as of January 2017, but the prison still remains in operation. (359) How has a prison and torture facility with no regard for human rights been allowed to operate for so long, especially after so many known human rights violations and incidents of torture have occurred?

After World War II, the United States launched '*Operation Paperclip*' to gain a military advantage by recruiting and bringing more than 1,600 German scientists, engineers, and technicians, many of which were former registered members of the Nazi Party, some of which also had leadership roles in the Nazi Party. Similarly, Russia launched '*Operation Osoaviakhim*' recruiting more than 2,000 German specialists. How could so many war criminals be simply ignored and allowed to escape justice? Was the knowledge really worth the price of letting known war criminals go free and having a prosperous life in the United States?

The 2003 Iraq war was unjustified and based on lies. How can a United States president and his administration lie to the world about a country possessing chemical weapons and being a threat, invade that country, and then admit that it was all based on bad intelligence? Why have none of these officials who are responsible ever been charged with war crimes? The October 2003 PBS Frontline program, '*Truth, War, and Consequences*' explains exactly how the Bush administration pulled off one of the greatest lies ever told to Americans with no consequences whatsoever. There are also two documentaries by Errol Morris, '*The Fog of War: Eleven Lessons from the Life of Robert S. McNamara*', 2003 and '*The Unknown Known*', 2013 which offer a rare glimpse inside the minds of former United States Defense secretaries Donald Rumsfeld and Robert S. McNamara. Another excellent perspective on war is the 2017 documentary '*The Vietnam War*' by: Ken Burns and Lynn Novick.

List of Recent Major Military Conflicts Involving the United States	
War/Conflict	Estimated Total Tons of Bombs Dropped
World War II	3,500,000 tons
Korean War	635,000 tons
Vietnam War	7,662,000 tons
1991 Iraq War	88,500 tons
2001-present War on Terror Afghanistan	No official statistics. But the Bureau of Investigative Journalism (BOIJ) estimates 1,542 drone strikes from 2015 – early 2017 with between 2,538 – 3270 casualties. (243)
2002-present War on Terror Yemen	No official statistics. But BOIJ estimates 146 drone strikes from 2002 – early 2017 with between 603 – 873 casualties. (243)
2003-2011 Iraq War	No official or estimated statistics on the number of bombs dropped or the total tons of bombs dropped, but Seymour Hersh of the New Yorker stated, "Oh, my God, it's the total X factor. There's been no public discussion by this administration of airpower in terms of how many missions, how much tonnage.

	During the Vietnam War--I'm long of tooth, and I remember that--we used to get a daily account of how many sorties--That's one flight, by one bomber--how many sorties, how much tonnage, and one could get a sense of what--how--where--the air war was very intense then. And here only you get anecdotal stuff. The one statistic we found is really quite amazing. A Marine Air Wing, which is responsible for close air support of the Marines in the field, reported that between fall of '03 and late fall of '04, about 15 months, it expended 500,000 tons of ordnance, and that is two million, 500-pound bombs--two million, 500-pound bombs--one Marine Air Wing. We have many more Air Wings that are being flown by the Air Force and by the Navy.” (128)
2004-present War on Terror Northwest Pakistan	No official statistics but BOIJ estimates 425 drone strikes from 2004 – early 2017 with between 2,501 – 4,003 casualties. It should also be noted that under George Bush there were 51 drone strikes compared with 373 drone strikes under Barack Obama, a 631% increase. (243)
2011-present Syrian Civil War AKA War on ISIS	No official or estimated statistics but the US has fired off more than 20,000 missiles and bombs and General Mark Welsh stated they were, “expending munitions faster than we can replenish them...B-1s have dropped bombs in record numbers.” (129) A November 16, 2017 New York Times article stated that the coalition has conducted more than 27,500 air strikes to date in Iraq and Syria against ISIS, with a variety of air power from Predator drones to B-52s. (596)
2011-present War on Terror Somalia	No official statistics. But BOIJ estimates 32 drone strikes from 2011 – early 2017 with between 242 – 418 casualties. (243)
TOTAL: 11,885,500 tons of bombs or 2,377,100 Elephants	
SOURCE: Wikipedia (with some corrections, additions, and other edits) NOTE: Elephant comparison is based on a 5-ton average weight.	

Less than 20 nations, mainly the United States, Russia, Syria, Iran, Iraq, Libya, India, China, Japan, Germany, North Korea, and United Kingdom have either developed and tested, stockpiled, sold, or used chemical and/ or biological weapons. Chemical weapons over the last 105 years have killed, injured, or permanently disabled millions of *Homo sapiens*. The United States military alone dropped about 388,000 tons of napalm bombs in Indochina between 1963 and 1973, during the Korean War 32,357 tons, and 16,500 tons on Japan during World War II. (576) After World War II the United States, United Kingdom, and Russia disposed of many chemical weapons by dumping them in the ocean, an estimated 1,000,000 metric tons of chemical weapons still lie on the ocean floor. (251) How can chemical weapons like tear gas still be used by local law enforcement for riot control, and yet these lachrymatory agents are prohibited during wartime by international treaties for chemical weapons?

In 2017, there were an estimated 110,000,000 million landmines which were left from previous wars and conflicts in Egypt, Iran, Afghanistan, Angola, China, Vietnam, Iraq, Cambodia, Bosnia and Herzegovina, and Kuwait. Since 1975 more than 1,000,000 *Homo sapiens* have died and millions of other have been maimed as a result of these mines exploding without warning, and every month an estimated 800 more die and hundreds of others are maimed. (264) In the United States and at overseas U.S. facilities, there are 1,400 locations covering 10,000,000 acres which contain unexploded munitions dating back to World War I. (263) Thousands of unexploded munitions are also discovered each year during construction projects worldwide, but more especially in Europe as a result of the munitions dropped during World War II. How many thousands of bombs and other similar unexploded munitions are there left waiting to be discovered and possibly explode killing or maiming even more *Homo sapiens*? How many unexploded munitions lie at the bottom of the Ocean with old Navy ships sunk during wartime?

An often-overlooked consequence of war is the affect it has on the Earth’s landscapes and also the large number of florae and faunae which are destroyed by using scorched-Earth tactics, from the bombs being dropped, the tanks and other vehicles traveling through ecosystems, and even the thousands of troops marching to their deaths. Direct and intentional environmental destruction has also been used as a war tactic. Agent Orange was used by the British military in Malaya during the Malayan Emergency and by the United States during the Vietnam War to deforest large areas. Military training exercises and weapons testing can also be destructive to the environment, sometimes more so than actual war as an area of nature is constantly being impacted. The environmental effects of the military and war are an issue which has received little attention, as the subjects are surrounded by much secrecy, few regulations, and no real accountability. From the early wars fought on horses

to modern-day wars fought with technology, there has always been destruction to nature resulting from the chaos of war.

As of 2017, there are still dozens of abandoned military bases around the world, most of which have left a toxic legacy like Blue East Two and Camp Century in Greenland. (176) This easily preventable environmental destruction is a result of the United States military having left all the trash and other waste which accumulated during operations. Camp Century is one of the worst. It was part of project Iceworm, an elaborate secret military plan to build an underground military complex in Greenland covering an area of 52,000 square miles to house 600 nuclear missiles. The project eventually failed, and Camp Century was abandoned along with the biological, chemical, and radioactive waste based on the assumption that perpetual snowfall would bury the waste forever. Global warming and the melting of the ice sheets is now threatening to expose the toxic waste. Depleted uranium has been used to manufacture some ammunition since the first Gulf War, 1,200 tonnes of depleted uranium was dropped on Iraq between 1991 and 2003, and an enormous amount of depleted uranium has no doubt also been used during the Afghanistan War as well. A 2013 study concluded that,

“Iraq is suffering from depleted uranium (DU) pollution in many regions and the effects of this may harm public health through poisoning and increased incidence of various cancers and birth defects. DU is a known carcinogenic agent. About 1200 tonnes of ammunition were dropped on Iraq during the Gulf Wars of 1991 and 2003. As a result, contamination occurred in more than 350 sites in Iraq. Currently, Iraqis are facing about 140,000 cases of cancer, with 7000 to 8000 new ones registered each year. In Baghdad cancer incidences per 100,000 population have increased, just as they have also increased in Basra. The overall incidence of breast and lung cancer, Leukaemia and Lymphoma, has doubled even tripled. The situation in Mosul city is similar to other regions. Before the Gulf Wars Mosul had a higher rate of cancer, but the rate of cancer has further increased since the Gulf Wars.” (177)

During the first Gulf War in 1991, the Iraqi military forces engaged in a scorched Earth policy and started the Kuwait oil fires and the Gulf War oil spill releasing an estimated 42,000,000,000 to 63,000,000,000 gallons of oil into the environment. During World War II allied forces conducted 623 air raids on Nazi Germany oil refineries and storage facilities in what is known as the ‘*Oil Campaign of World War II*’. How many millions of gallons of oil burned during these targeted air raids? During the last 5,000 years, how many millions of flora and fauna have perished as a result of all the wars, military exercises, and other clandestine operations? What if the military forces of the world took all their money and resources for war, and instead of destroying the planet they became an environmental protection force? Could not the great world military powers of the U.S., China, Russia, U.K, France, India, Pakistan, Korea, Australia, and others unite to help combat global environmental threats instead of preparing to fight each other? What about an international Navy to patrol and protect the oceans and other hydrosphere resources from *Homo sapiens* depredations?



SOURCE: National Museum of the US Air Force - Images taken during World War II while conducting '*Operation Tidal Wave*', a strategic bombing mission and part of the '*oil campaign*' to deny petroleum-based fuel to the Axis.



SOURCE: U.S. Navy and U.S. Air Force – Although the weapons have become more advanced, these photos of United States war planes flying over burning oil fields in Kuwait during the Gulf War are an eerie reminder of a not too distant past.

The environmental impacts of war and terrorism can be felt long after the actual battle or attack has taken place. As a result of the September 11 terrorist attacks, there are still the lingering health issues which currently affect 37,000 *Homo sapiens* and have killed more than 1,000. These rescue workers and others who were at ground zero now have a wide range of health issues resulting from the inhalation and skin exposure to the toxic ash and dust. They were even assured by Christine Todd Whitman, the then head of the Environmental Protection Agency (EPA), that the air was safe. She has since said she was mistaken. (218)

Based on data from the International Institute for Strategic Studies (IISS), in 2017 the militaries of the world consisted of: 104,476 main battle tanks, 29,730 military aircraft and attack helicopters, 511 nuclear and non-nuclear submarines, and 976 other water vessels (aircraft carriers, amphibious warfare ships, cruisers, destroyers, frigates, corvettes, etc.) How much environmental damage do all of these weapons of war unleash each day just preparing and waiting for war? A 2014 Guardian news report on the impact of modern war by Karl Mathiesen stated,

“The US Department of Defence is the country’s largest consumer of fossil fuels. Research from 2007 showed the military used 20.9bn litres of fuel each year. This results in similar CO₂ emissions to a mid-sized European country such as Denmark.

And that’s before they go to war. The carbon footprint of a deployed modern army is typically enormous. One report suggested the US military, with its tanks and Bradley fighting vehicles, used 190.8m litres of oil every month during the invasion of Iraq. An estimated two thirds of this fuel is used delivering more fuel to the vehicles at the battlefield.”

“During the Rwandan civil war almost three-quarters of a million people lived in camps on the edge of Virunga national park.

According to the Worldwatch Institute around 1,000 tonnes of wood was removed from the park every day for two years in order to build shelters, feed cooking fires and created charcoal for sale. By the time the conflict ended 105 sq km of forest had been damaged and 35 sq km stripped bare. “

“Ian Redmond, a wildlife consultant for Born Free says in the disorder and desperation of war the protections for precious wildlife habitats like Virunga evaporate. “War is bad for wildlife in as many ways as for people. Conservation suffers because rangers often have to flee the fighting, and may be attacked because rebel armies covet their vehicles, radios and guns. Moreover, rebels often feed their troops on bushmeat and finance their ops with ivory, timber, charcoal and minerals from protected areas.” The massive influx of high-powered weaponry into these areas means that during and after conflict, the scale of poaching can increase dramatically. In just two months in 2006, Mai-Mai rebels in the DRC slaughtered almost the entire hippopotamus population of two of Virunga’s rivers - changing the ecosystem forever.

In Afghanistan too, wildlife and habitats have disappeared. The past 30 years of war has stripped the country of its trees, including precious native pistachio woodlands. The Costs of War Project says illegal logging by US-backed warlords and wood harvesting by refugees caused more than one-third of Afghanistan’s forests to vanish between 1990 and 2007. Drought, desertification and species loss have resulted. The number of migratory birds passing through Afghanistan has fallen by 85%. Many of the above examples could be considered violations of international law. The Geneva Convention places restrictions on methods of warfare “which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment”. But Marie Jacobsson, a special rapporteur to the UN’s International Law Commission charged with assessing how legal frameworks can protect the environment from armed conflict, says the international legal protections are “rudimentary”. (178)

The United States has spent more than \$4,400,000,000,000 and counting, on wars in the Middle East since the September 11 terrorist attacks, and the War on Terror is far from over with a constant cycle of new extremist leaders taking the place of their dead predecessors as soon as they are killed. Terrorism and other forms of tyranny will most likely continue in small pockets around the globe for some time, so long as violence is used as the main solution to combat these negative elements of society versus peace, intellect, patience, understanding, and compromise. The tyrants who wage wars have always existed throughout history, but they have all fallen and never outlasted time or the power of social change through democracy. War and violence are never the answer no matter the circumstances and there will never be a valid justification for war, as there is always a peaceful alternative. War itself has been obsolete since its inception, as nothing negative will ever be successful in the end. Martin Luther King Jr. wrote the following remarks about violence,

“The ultimate weakness of violence is that it is a descending spiral, begetting the very thing it seeks to destroy. Instead of diminishing evil, it multiplies it. Through violence you may murder the liar, but you cannot murder the lie, nor establish the truth. Through violence you may murder the hater, but you do not murder hate. In fact, violence for violence multiplies violence, adding deeper darkness to a night already devoid of stars. Darkness cannot drive out darkness: only light can do that. Hate cannot drive out hate: only love can do that.

The beauty of nonviolence is that in its own way and in its own time it seeks to break the chain reaction of evil. With a majestic sense of spiritual power, it seeks to elevate truth, beauty and goodness to the throne.”

“Hate is just as injurious to the hater as it is to the hated. Like an unchecked cancer, hate corrodes the personality and eats away its vital unity. Many of our inner conflicts are rooted in hate. This is why the psychiatrist says, “Love or perish.” ... Hate is too great a burden to bear.

Of course, you may say, this is not *practical*; life is a matter of getting even, of hitting back, of dog eat dog. Maybe in some distant Utopia, you say, that idea will work, but not in the hard, cold world in which we live. My only answer is that mankind has followed the so-called practical way for a long time now, and it has led inexorably to deeper confusion and chaos. Time is cluttered with the wreckage of individuals and communities that surrendered to hatred and violence. For the salvation of our nation and salvation of mankind, we must follow another way.”

“Violence has been the inseparable twin of materialism, the hallmark of its grandeur and misery. This is the one thing about modern civilization that I do not care to imitate.

Humanity is waiting for something other than blind imitation of the past. If we want truly to advance a step further, if we want to turn over a new leaf and really set a new man afoot, we must begin to turn mankind away from the long and desolate night of violence.” (313)

An Incarcerated and Policed Society Living with Unwarranted Fear

In 2015, Amnesty International confirmed at least 1,634 executions, 573 more than in 2014 and the most carried

out since 1989. These numbers exclude data from Belarus, China, Vietnam, Laos, Malaysia, North Korea, Syria and Yemen where it remains unavailable, incomplete, or is classified. (388) Capital punishment in the United States is performed by some states, even though it contradicts the Eighth Amendment of the United States Constitution prohibiting cruel and unusual punishment. Is it not cruel and unusual to take the life of anyone in any form, under any circumstance be it murder, war, or vengeance? Isn't execution nothing more than vengeance? Does it serve any real purpose, or does it only perpetuate the negative cycle of violence? Does execution deter a possible future murderer or does simply instilling better morals from an early age? Is the morality of society any better than the criminals committing the crime when the punishment is the same action as the crime, in that of taking a life? If killing is illegal how can it be justifiable to kill the killer? Would not the moral and logical choice of rehabilitation through education and incarceration, if necessary, be the way to address the issue? What is the point of executing a small number of criminals while thousands of others remain incarcerated for life? It costs a tremendous amount of money for a state to engage in capital punishment. In 2011, the L.A. Times reported that in California alone,

“Taxpayers have spent more than \$4 billion on capital punishment in California since it was reinstated in 1978, or about \$308 million for each of the 13 executions carried out since then, according to a comprehensive analysis of the death penalty's costs.

The state's 714 death row prisoners cost \$184 million more per year than those sentenced to life in prison without the possibility of parole.” (164)

Prisons vary around the world from supermax prisons in the United States to the El penal de San Pedro in La Paz, Bolivia which holds more than 1,500 inmates with no guards inside the prison and is run by the prisoners themselves, and some wives and children of convicted criminals also living inside the prison walls. The current system of mass incarceration, if replaced with rehabilitation and education like Bastoy Prison in Norway, could benefit the incarcerated far more than the current system of justice practiced almost universally, which is the mentality of *'Lock them up and throw away the key.'* This approach has shown to be ineffective, as many of the incarcerated are either drug addicts, have mental issues, and/or are individuals which lacked proper morals being instilled at an early age and are nothing more than a product of a dysfunctional society or a result of the inhospitable environment which they were fostered in. They simply need to be educated and shown how, through example, to become positive members of society. Worldwide there are an estimated 10,357,134 *Homo sapiens* which are held in prisons, either as pre-trial detainees or those who have been convicted and sentenced. The United States incarcerates the most with 2,217,000 prisoners, an increase from 1,937,482 prisoners in 2000. The world prison population has increased by 19.5% since about 2000. (501) Why has the prison population increased, is it from an increase in excessive policing, stricter laws, or from moral erosion within the society? Shouldn't the world prison population be decreasing as the world today is more modern and educated than at any point in history? How is it possible that there are so many prisoners in the United States, a free and democratic nation with such a just system of laws? Are there too many antiquated or irrelevant laws which incarcerate individuals for unjust crimes like smoking cannabis? How many incarcerations are alcohol related?

Many prisons in the United States are not only extremely unhealthy for the incarcerated, but also severely deplete the environment around them. A June 2017 Moyers and Company report, *'America's Toxic Prisons: The Environmental Injustices of Mass Incarceration'*, reported that over the last decade 3,500 California prisoners have contracted valley fever with more than 50 dying from it. In Texas state officials acknowledged that 22 hyperthermia deaths occurred, and yet 79 of the 108 state prison units still lacked air-conditioning as of 2017. At SCI Fayette prison, in LaBelle, Pennsylvania, prisoners reported the water always had a brown tint to it, and at the Wallace Pack Unit in Texas the water was also brown, until a federal judge ordered the state to provide the prisoners with safe drinking water. As of 2017, there were 589 federal and state prisons which are located within 3 miles of a toxic Superfund cleanup site. Over the past 5 years there were prisons in around 30 states which had more than 1,000 violations of federal environmental laws. The California Men's Colony state prison (CMC), near San Luis Obispo, has had a legacy of water pollution from dumping more than 240,000 gallons of sewage into Chorro Creek which flows into the protected marine estuary Morro Bay. Between 2008 and 2015 the Monroe Correctional Complex in Washington dumped around 500,000 gallons of contaminated water polluting nearby rivers and wetlands. Federal and state agencies over the last 5 years, utilizing the Clean Water Act, have

brought 132 informal actions and 28 formal actions against prisons. During this same time, the EPA under the Clean Air Act, has brought 92 informal actions and 51 formal actions against prisons, jails, and detention centers. (540)

There are undoubtedly thousands of wrongly convicted *Homo sapiens* that have been victims of an inadequate justice system which has the potential to make errors and become corrupt from within. Lack of professionalism, training, and standards have also led to easily preventable wrongful convictions, and in some cases even death. In 2015, the FBI issued a press release which stated,

"The United States Department of Justice (DOJ), the Federal Bureau of Investigation (FBI), the Innocence Project, and the National Association of Criminal Defense Lawyers (NACDL) reported today that the FBI has concluded that the examiners' testimony in at least 90 percent of trial transcripts the Bureau analyzed as part of its Microscopic Hair Comparison Analysis Review contained erroneous statements. Twenty-six of 28 FBI agent/analysts provided either testimony with erroneous statements or submitted laboratory reports with erroneous statements...

...The review encompasses cases where FBI microscopic hair comparison was used to link a defendant to a crime and covers cases in both federal and state court systems. It does not, however, cover cases where hair comparison was conducted by state and local crime labs, whose examiners may have been trained by the FBI. The FBI has trained hundreds of state hair examiners in annual two-week training courses.

The government identified nearly 3,000 cases in which FBI examiners may have submitted reports or testified in trials using microscopic hair analysis. As of March 2015, the FBI had reviewed approximately 500 cases. The majority of these cases were trials and the transcript of examiner testimony was reviewed. Some of these cases ended in guilty pleas, limiting the review to the original lab report. In the 268 cases where examiners provided testimony used to inculcate a defendant at trial, erroneous statements were made in 257 (96 percent) of the cases. Defendants in at least 35 of these cases received the death penalty and errors were identified in 33 (94 percent) of those cases. Nine of these defendants have already been executed and five died of other causes while on death row. The states with capital cases included Arizona, California, Florida, Indiana, Missouri, Ohio, Oklahoma, Pennsylvania, Tennessee, and Texas. It should be noted that this is an ongoing process and that the numbers referenced above will change." (549)

DNA has been used to exonerate more than 220 wrongfully convicted *Homo sapiens* since 1989. Forensics is used now more than ever, and while forensics can be a potentially good addition to the justice system, it has been shown that it is sometimes performed by unqualified individuals who have no education, training, or experience, are not experts in any field of science, and often use confusing or misleading language to cover-up the fact that the evidence is not 100% certain and could potentially be flawed. A 2016 recommendation by The National Commission on Forensic Science to the Attorney General stated,

"Forensic discipline conclusions are often testified to as being held "to a reasonable degree of scientific certainty" or "to a reasonable degree of [discipline] certainty." These terms have no scientific meaning and may mislead factfinders about the level of objectivity involved in the analysis, its scientific reliability and limitations, and the ability of the analysis to reach an individualized conclusion. Forensic scientists, medical professionals and other scientists do not routinely express opinions or conclusions "to a reasonable scientific certainty" outside of the courts. Neither the Daubert or Frye test of scientific admissibility requires its use, and consideration of caselaw from around the country confirms that use of the phrase is not required by law and is primarily a relic of custom and practice. There are additional problems with this phrase, including:

There is no common definition within science disciplines as to what threshold establishes "reasonable" certainty. Therefore, whether couched as "scientific certainty" or "[discipline] certainty," the term is idiosyncratic to the witness.

The term invites confusion when presented with testimony expressed in probabilistic terms. How is a lay person, without either scientific or legal training, to understand an expert's "reasonable scientific certainty" that evidence is "probably" or possibly linked to a particular source?" (550)

And a 2012 National Institute of Standards and Technology interagency/internal report stated,

"Outside the courtroom, however, scientists do not communicate their findings in this fashion. An astronomer who reports the discovery of an exoplanet does not characterize the finding as satisfying some "reasonable degree of scientific certainty." A chemist who deduces the identity of a compound from its nuclear magnetic resonance spectrum has no table of degrees of scientific certainty with which to label the deduction. Scientists might refer to personal degrees of confidence in a finding or to the degree of controversy surrounding it, but there is no generally accepted or working definition of a "reasonable degree of certainty" in scientific discourse." (551)

Some techniques which are used in forensic science also allow the results to be easily tainted by accident, as there are few established protocols in place. Other areas of forensic science which have been developed in a crime laboratory to aid in a criminal case are not based on any scientific standards at all. There have been numerous instances of wrongfully convicted *Homo sapiens* and some have even been executed by mistake. Some jurors are also now tainted before the trial even begins as a result of watching so much police drama television that they have what has been dubbed as the '*CSI Effect*'. A 2009 National Research Council committee concluded,

"The increased use of DNA analysis as a more reliable approach to matching crime scene evidence with suspects and victims has resulted in the reevaluation of older cases that retained biological evidence that could be analyzed by DNA. The number of exonerations resulting from the analysis of DNA has grown across the country in recent years, uncovering a disturbing number of wrongful convictions—some for capital crimes—and exposing serious limitations in some of the forensic science approaches commonly used in the United States.

According to The Innocence Project, there have been 223 postconviction DNA exonerations in the United States since 1989 (as of November 2008). Some have contested the percentage of exonerated defendants whose convictions allegedly were based on faulty science. Although the Innocence Project figures are disputed by forensic scientists who have reexamined the data, even those who are critical of the conclusions of The Innocence Project acknowledge that faulty forensic science has, on occasion, contributed to the wrongful conviction of innocent persons.

The fact is that many forensic tests—such as those used to infer the source of toolmarks or bite marks—have never been exposed to stringent scientific scrutiny. Most of these techniques were developed in crime laboratories to aid in the investigation of evidence from a particular crime scene, and researching their limitations and foundations was never a top priority. There is some logic behind the application of these techniques; practitioners worked hard to improve their methods, and results from other evidence have combined with these tests to give forensic scientists a degree of confidence in their probative value. Before the first offering of the use of DNA in forensic science in 1986, no concerted effort had been made to determine the reliability of these tests, and some in the forensic science and law enforcement communities believed that scientists' ability to withstand cross-examination in court when giving testimony related to these tests was sufficient to demonstrate the tests' reliability. However, although the precise error rates of these forensic tests are still unknown, comparison of their results with DNA testing in the same cases has revealed that some of these analyses, as currently performed, produce erroneous results. The conclusions of forensic examiners may or may not be right—depending on the case—but each wrongful conviction based on improperly interpreted evidence is serious, both for the innocent person and also for society, because of the threat that may be posed by a guilty person going free. Some non-DNA forensic tests do not meet the fundamental requirements of science, in terms of reproducibility, validity, and falsifiability.

Even fingerprint analysis has been called into question. For nearly a century, fingerprint examiners have been comparing partial latent fingerprints found at crime scenes to inked fingerprints taken directly from suspects. Fingerprint identifications have been viewed as exact means of associating a suspect with a crime scene print and rarely were questioned. Recently, however, the scientific foundation of the fingerprint field has been questioned, and the suggestion has been made that latent fingerprint identifications may not be as reliable as previously assumed. The question is less a matter of whether each person's fingerprints are permanent and unique—uniqueness is commonly assumed—and more a matter of whether one can determine with adequate reliability that the finger that left an imperfect impression at a crime scene is the same finger that left an impression (with different imperfections) in a file of fingerprints. In October 2007, Baltimore County Circuit Judge Susan M. Souder refused to allow a fingerprint analyst to testify that a latent print was made by the defendant in a death penalty trial. In her ruling, Judge Souder found the traditional method of fingerprint analysis to be "a subjective, untested, unverifiable identification procedure that purports to be infallible."

Some forensic science methods have as their goal the "individualization" of specific types of evidence (typically shoe and tire impressions, dermal ridge prints, toolmarks and firearms, and handwriting). Analysts using such methods believe that unique markings are acquired by a source item in random fashion and that such uniqueness is faithfully transmitted from the source item to the evidence item being examined (or in the case of handwriting, that individuals acquire habits that result in unique handwriting). When the evidence and putative source items are compared, a conclusion of individualization implies that the evidence originated from that source, to the exclusion of all other possible sources. The determination of uniqueness requires measurements of object attributes, data collected on the population frequency of variation in these attributes, testing of attribute independence, and calculations of the probability that different objects share a common set of observable attributes. Importantly, the results of research must be made public so that they can be reviewed, checked by others, criticized, and then revised, and this has not been done for some of the forensic science disciplines. As recently as September 2008, the Detroit Police crime laboratory was shut down following a Michigan State Police audit that found a 10 percent error rate in ballistic evidence.

The forensic science community has had little opportunity to pursue or become proficient in the research that is needed to support what it does. Few sources of funding exist for independent forensic research. Most of the studies are commissioned by DOJ and conducted by crime laboratories with little or no participation by the traditional scientific community. In addition, most disciplines in the profession are hindered by a lack of enforceable standards for interpretation of data.

In recent years, the integrity of crime laboratories increasingly has been called into question, with some highly publicized cases highlighting the sometimes lax standards of laboratories that have generated questionable or fraudulent evidence and that have lacked quality control measures that would have detected the questionable evidence. In one notorious case, a state-mandated review of analyses conducted by West Virginia State Police laboratory employee Fred Zain revealed that the convictions of more than 100 people were in doubt because Zain had repeatedly falsified evidence in criminal prosecutions. At least 10 men had their convictions overturned as a result. Subsequent reviews questioned whether Zain was ever qualified to perform scientific examinations.

Other scandals, such as one involving the Houston Crime Laboratory in 2003, highlight the sometimes blatant lack of proper education and training of forensic examiners. In the Houston case, several DNA experts went public with accusations that the DNA/Serology Unit of the Houston Police Department Crime Laboratory was performing grossly incompetent work and was presenting findings in a misleading manner designed to unfairly help prosecutors obtain convictions. An audit by the Texas Department of Public Safety confirmed serious inadequacies in the laboratory's procedures, including "routine failure to run essential scientific controls, failure to take adequate measures to prevent contamination of samples, failure to adequately document work performed and results obtained, and routine failure to follow correct procedures for computing statistical frequencies."

The Innocence Project has documented instances of both intentional and unintentional laboratory errors that have led to wrongful convictions, including:

- In the laboratory—contamination and mislabeling of evidence.
- In information provided in forensics reports—falsified results (including "drylabbing," i.e., providing conclusions from tests that were never conducted), and misinterpretation of evidence.
- In the courtroom—suppression of exculpatory evidence; providing a statistical exaggeration of the results of a test conducted on evidence; and providing false testimony about test results.

Saks and Koehler have written that the testimony of forensic scientists is one of many problems in criminal cases today.³⁰ They cite the norms of science, which emphasize "methodological rigor, openness, and cautious interpretation of data," as norms that often are absent from the forensic science disciplines.

Although cases of fraud appear to be rare, perhaps of more concern is the lack of good data on the accuracy of the analyses conducted in forensic science disciplines and the significant potential for bias that is present in some cases. For example, the FBI was accused of bias in the case of the Madrid bombing suspect Brandon Mayfield. In that case, the Inspector General of DOJ launched an investigation. The FBI conducted its own review by a panel of independent experts. The reviews concluded that the problem was not the quality of the digital images reviewed, but rather the bias and "circular reasoning" of the FBI examiners.

Parts of the forensic science community have resisted the implications of the mounting criticism of the reliability of forensic analyses by investigative units such as Inspector General reports, The Innocence Project, and studies in the published literature. In testimony before the committee, it was clear that some members of the forensic science community will not concede that there could be less than perfect accuracy either in given laboratories or in specific disciplines, and experts testified to the committee that disagreement remains regarding even what constitutes an error. For example, if the limitations of a given technology lead to an examiner declaring a "match" that is found by subsequent technology (e.g., DNA analysis) to be a "mismatch," there is disagreement within the forensic science community about whether the original determination constitutes an error. Failure to acknowledge uncertainty in findings is common: Many examiners claim in testimony that others in their field would come to the exact same conclusions about the evidence they have analyzed. Assertions of a "100 percent match" contradict the findings of proficiency tests that find substantial rates of erroneous results in some disciplines (i.e., voice identification, bite mark analysis).

As an example, in a FBI publication on the correlation of microscopic and mitochondrial DNA hair comparisons, the authors found that even competent hair examiners can make significant errors. In this study, the authors found that in 11 percent of the cases in which the hair examiners declared two hairs to be "similar," subsequent DNA testing revealed that the hairs did not match, which refers either to the competency or the relative ability of the two divergent techniques to identify differences in hair samples, as well as to the probative value of each test.

The insistence by some forensic practitioners that their disciplines employ methodologies that have perfect accuracy and produce no errors has hampered efforts to evaluate the usefulness of the forensic science disciplines. And, although DNA analysis is considered the most reliable forensic tool available today, laboratories nonetheless can make errors working with either nuclear DNA or mtDNA—errors such as mislabeling samples, losing samples, or misinterpreting the data.

Standard setting, accreditation of laboratories, and certification of individuals aim to address many of these problems, and although many laboratories have excellent training and quality control programs, even accredited laboratories make mistakes.

Furthermore, accreditation is a voluntary program, except in a few jurisdictions in which it is required (New York, Oklahoma, and Texas).

Media attention has focused recently on what is being called the “CSI Effect,” named for popular television shows (such as Crime Scene Investigation) that are focused on police forensic evidence investigation. The fictional characters in these dramas often present an unrealistic portrayal of the daily operations of crime scene investigators and crime laboratories (including their instrumentation, analytical technologies, and capabilities). Cases are solved in an hour, highly technical analyses are accomplished in minutes, and laboratory and instrumental capabilities are often exaggerated, misrepresented, or entirely fabricated. In courtroom scenes, forensic examiners state their findings or a match (between evidence and suspect) with unfailing certainty, often demonstrating the technique used to make the determination. The dramas suggest that convictions are quick and no mistakes are made.

The CSI Effect specifically refers to the real-life consequences of exposure to Hollywood’s version of law and order. Jurists and crime laboratory directors anecdotally report that jurors have come to expect the presentation of forensic evidence in every case, and they expect it to be conclusive. A recent study by Schweitzer and Saks found that compared to those who do not watch CSI, CSI viewers were “more critical of the forensic evidence presented at the trial, finding it less believable. Forensic science viewers expressed more confidence in their verdicts than did nonviewers.” Prosecutors and defense attorneys have reported jurors second guessing them in the courtroom, citing “reasonable doubt” and refusing to convict because they believed that other evidence was available and not adequately examined.

Schweitzer and Saks found that the CSI Effect is changing the manner in which forensic evidence is presented in court, with some prosecutors believing they must make their presentation as visually interesting and appealing as such presentations appear to be on television. Some are concerned that the conclusiveness and finality of the manner in which forensic evidence is presented on television results in jurors giving more or less credence to the forensic experts and their testimony than they should, raising expectations, and possibly resulting in a miscarriage of justice. The true effects of the popularization of forensic science disciplines will not be fully understood for some time, but it is apparent that it has increased pressure and attention on the forensic science community in the use and interpretation of evidence in the courtroom.

Fragmented and Inconsistent Medicolegal Death Investigation The medicolegal death investigation system is a fragmented organization of state and local entities called upon to investigate deaths and to certify the cause and manner of unnatural and unexplained deaths. About 1 percent of the U.S. population (about 2.6 million people) dies each year. Medical examiner and coroner offices receive nearly 1 million reports of deaths, constituting between 30 to 40 percent of all U.S. deaths in 2004, and accept about one half of those (500,000, or 1 in 5 deaths) for further investigation and certification.⁴¹ In carrying out this role, medical examiners and coroners are required to decide the scope and course of a death investigation, which may include assessing the scene of death, examining the body, determining whether to perform an autopsy, and ordering other medical tests, forensic analyses, and procedures as needed. Yet the training and skill of medical examiners and coroners and the systems that support them vary greatly. Medical examiners may be physicians, pathologists, or forensic pathologists with jurisdiction within a county, district, or state. A coroner is an elected or appointed official who might not be a physician or have had any medical training. Coroners typically serve a single county.

Since 1877, in the United States, there have been efforts to replace the coroner system with a medical examiner system. In fact, more than 80 years ago, the National Academy of Sciences identified concerns regarding the lack of standardization in death investigations and called for the abolishment of the coroner’s office, noting that the office “has conclusively demonstrated its incapacity to perform the functions customarily required of it.” In its place, the report called for well-staffed offices of a medical examiner, led by a pathologist. In strong terms, the 1928 committee called for the professionalization of death investigation, with medical science at its center.

Despite these calls, efforts to move away from a coroner system in the United States have stalled. Currently, 11 states have coroner-only systems, 22 states have medical examiner systems, and 18 states have mixed systems—in which some counties have coroners and others have medical examiners. Some of these states have a referral system, in which the coroner refers cases to medical examiners for autopsy. According to a 2003 Institute of Medicine report, in addition to the variety of systems in the United States, the location and authority of the medical examiner or coroner office also varies, with 43 percent of the U.S. population served by a medical examiner or coroner housed in a separate city, county, or state government office. Other arrangements involve an office under public safety or law enforcement. The least common placement is under a forensic laboratory or health department.

Variability also is evident in terms of accreditation of death investigation systems. As of August 2008, 54 of the medical examiner offices in the United States (serving 23 percent of the population) have been accredited by the National Association of Medical Examiners, the professional organization of physician medical examiners. Most of the country is served by offices lacking accreditation. Similarly, requirements for training are not mandatory. About 36 percent of the population lives where minimal or no special training is required to conduct death investigations. Recently, an 18-year-old high school student was elected a deputy coroner in Indiana after completing a short training course.” (548)

In 1973, the drug field test was patented, and police departments began implementing use of the test even though

the tests are extremely unreliable, as they can give a false-positive result from exposure to more than 80 other compounds besides illegal drugs. And while there are no official or comprehensive statistics on wrongful convictions because of errors in field drug tests, thousands of cases have been dismissed because of a false-positive field drug test, (482) and thousands of other innocent citizens have most likely been wrongfully convicted as a result of a false-positive field drug test. A 2013 federal survey of United States forensic laboratories, found that 8 out of 10 responding laboratories reported that they don't analyze all drug cases which are submitted to them. (483) Why are drug field tests admissible in some courts when they can give such an easy false-positive result, shouldn't a secondary more definitive technique such as mass spectrometry be used to confirm the initial results? How many thousands of *Homo sapiens* have been wrongly accused and possibly even convicted because of these tests? Why are so many incarcerated in the United States because of unjust mandatory minimum sentences, a technicality, and other minor infractions or non-violent crimes? How many millions of American citizens have been incarcerated since the 1970s as a result of the failing War on Drugs? (387) Why aren't more comprehensive databases and statistics kept by the government on injustices so that the continual cause can be corrected, instead of just accepting it as a part of the justice system and that innocence will at some point prevail? Isn't the United States criminal justice system first and foremost based on that the crime must be proven beyond a reasonable doubt? If a forensic technique has been shown to be flawed on numerous occasions shouldn't it be abandoned? How just is a system with so many errors being allowed to occur? As of 2017 Alaska, Arizona, Arkansas, Delaware, Georgia, Idaho, Indiana, Kansas, Kentucky, Nevada, New Mexico, North Dakota, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, and Wyoming do not have any compensation statutes, will these states ever give the wrongly convicted the financial support, housing, education, food, medical services, and other assistance that they are owed?

After the September 11 terrorist attacks, there was a mentality of fear spread by demagogues and their paranoid followers that more terrorist attacks even worse than the September 11 terrorist attacks would follow, and that Americans must be prepared with more cameras and more police with a larger and more military style arsenal. But the reality is, that in the United States after the September 11 terrorist attacks up until 2015, only 95 *Homo sapiens* were killed as a result of jihadist-based terrorism, while over that same time frame 410,522 *Homo sapiens* died as a result of a domestic firearms. (e.g. accidents, homicide, suicide, etc.) (278) Between 1977 and 2016 anti-abortion extremists committed 11 murders, 26 attempted murders, 42 bombings, 186 arson attacks, 98 attempted bombings or arson attacks, 411 invasions, 1,643 acts of vandalism, 100 butyric acid attacks, 663 anthrax or bioterrorism threats, 239 assault and battery incidents, 545 death threats or threats of harm, 4 kidnappings, 255 burglaries, and 583 incidents of stalking. (533) Hari Sreenivasan on the PBS NewsHour reported that,

"Despite the nation's intense national focus on Islamic terrorism since 9/11, homegrown, right wing extremists have also killed dozens of Americans. The groups include white supremacist and neo-Nazi groups and anti-federalists militias. Since 2001, the number of violent attacks on U.S. soil inspired by far-right ideology has spiked to an average of more than 300 a year, according to a study by the Combating Terrorism Center at West Point.

A 2015 survey of U.S. law enforcement groups found they consider anti-government violent extremists to be a more severe threat than radicalized Muslims. And while jihadist terrorists have killed 95 people in the U.S. since 9/11, far-right extremists have killed 68 during the same time, including the car attack in Charlottesville." (498)

In the United States, there are some 33,000 violent street gangs, motorcycle gangs, and prison gangs with about 1,400,000 members which are criminally active. (600) Should not more federal money and resources be allocated to eliminating violent political and religious extremists, domestic terrorism, gangs, and other criminal organizations through education and societal changes, instead of arming the police to fight terrorists with weapons that will most likely never be used except during training? Since the September 11 terrorist attacks, there has been a militarization of police departments throughout the United States with many officers becoming even more military in their appearance by utilizing billions of dollars' worth of recycled military equipment. Some police departments have in essence created a secret police state by their actions and abuses of power. In September 2014, the Washington Post published their findings from an investigation it did about a dramatic increase of illegal police search and seizures after the September 11 terrorist attacks. During their investigation they found that,

“There have been 61,998 cash seizures made on highways and elsewhere since 9/11 without search warrants or indictments through the Equitable Sharing Program, totaling more than \$2.5 billion. State and local authorities kept more than \$1.7 billion of that while Justice, Homeland Security and other federal agencies received \$800 million. Half of the seizures were below \$8,800. Only a sixth of the seizures were legally challenged, in part because of the costs of legal action against the government. But in 41 percent of cases — 4,455 — where there was a challenge, the government agreed to return money. The appeals process took more than a year in 40 percent of those cases and often required owners of the cash to sign agreements not to sue police over the seizures.” (173)

Currently there are no federal government entities which collect data on all criminal arrests of law enforcement officers, nor are there any federal government entities which monitor all police shootings which occur, therefore most statistical data on these subjects has been primarily gathered from news reports or concerned organizations. Between 1976 and 2011, the police in the United States killed at least 14,012 *Homo sapiens*, perhaps even more. (210) In 2015, there were 1,146 *Homo sapiens* killed by police in the United States, 230 of them were unarmed, and in 2016 there were 1,093 police shootings which resulted in a death. (211) In 2015, the Washington Post and Bowling Green State University researched police killings in the United States, they found that since 2005 out of the thousands of killings by the police, and even with evidence that hundreds of the victims were unarmed and some even shot in the back, only 53 officers were ever charged with a crime. Out of those officers charged, 21 were not convicted, 11 were convicted, 19 were pending cases, and 3 made other deals. (212) When a police shootout occurs, it often results in mass quantities of bullets being fired, like when 13 Cleveland police officers fired 137 shots into a car killing the unarmed driver and passenger, with one officer alone firing 49 of the shots. (476) The U.S. Customs and Border Protection Agency was established in 2003, it now employs 56,000 agents, 177 of which were arrested for official misconduct, between 2004 and 2015. (477) A 2016 study, of only state and local law enforcement agencies, identified 6,724 arrest cases between 2005 and 2011 which involved 5,545 sworn law enforcement officers engaged in either sex-related, drug-related, alcohol-related, profit-motivated, or violence-related crimes. Many of these officers were never prosecuted and remained law enforcement officers, the study found,

“-Sex-related police crime included 1,475 arrest cases of 1,070 sworn officers
- Alcohol-related police crime included 1,405 arrest cases of 1,283 sworn officers
- Drug-related police crime included 739 arrest cases of 665 sworn officers
- Violence-related police crime included 3,328 arrest cases of 2,586 sworn officers
- Profit-motivated police crime included 1,592 cases of 1,396 sworn officers”

"The study identified a total of 422 forcible or statutory rapes, 352 cases of forcible fondling, and 94 sodomy arrest cases. Children seem to be particularly vulnerable to law enforcement officers who perpetrate sex crimes. Almost one-half of the known victims were children, and the second-most commonly occurring category in terms of the victim's relationship to the arrested officer was an unrelated child. Arrested officers were criminally convicted on at least one charge in four-fifths (80%) of the sex-related cases in which conviction data were available."

"For example, many of the police DUI arrest cases involved traffic accidents (51%) often resulting in victim injury (24.1%) or fatalities (4%). Arrested officers are known to have lost their jobs as sworn law enforcement officers in less than one-third (29.8%) of the police DUI arrest cases."

"More than two-thirds of the sworn law enforcement officers arrested for profit-motivated crime lost their jobs (67%) and more than half of the profit-motivated arrest cases resulted in conviction (57.4%)." (478)

Why are so many trigger-happy individuals and criminals allowed to become officers of the law? Could these murders and criminal acts be eliminated if police officers were initially evaluated and screened more thoroughly for possible psychological issues? Should there not be more policing of the police which wield so much power over society? How many other thousands of criminal acts have police done and gotten away with? Why isn't precise data involving police crimes and shootings collected and disseminated by the federal government? Why are only a small portion of the police officers prosecuted for their crimes? How pure is a justice system that has statutes of limitations for so many crimes, especially when clear evidence so plainly exists many times in the form of a confession from the criminal? What does it say about the morals and trust of society, when security systems like armed guards, locks, alarm systems, and cameras must be implemented to maintain order and civil stability? Can members of society not have better morals instilled by being fostered and educated not only by their parents or mentors, but also by an example set by society as a whole?

Guns

Since 1872, the National Rifle Association has lobbied in Washington D.C. for legislation which promotes the sale and possession of guns, while also fighting against gun-control policies. There are an estimated 875,000,000 small arms in the world, 200,000,000 which arm the militaries, 25,000,000 held by the police, and 650,000,000 possessed by individual civilian gun enthusiasts and criminals. (567) In 2017, in the United States, there were an estimated 265,000,000 guns possessed by 17% of the population, and each year the number of guns manufactured continues to rise while the number of individual gun owners falls. Half of the guns in the United States are possessed by just 3% of American adults, with these super gun owners possessing between 8 and 140 guns each. (464) United States gun manufacturers made 3,040,934 guns in 1986, and this number increased to 10,884,792 guns in 2013. (330)

In the United States, between 2001 and 2015, there were 177,731 reported unintentional nonfatal injuries resulting from a BB or pellet gunshot, in addition to 236,783 unintentional firearm gunshot injuries. (500) Between 1968 and 2011, there were 1,400,000 firearm deaths in the United States. (331) There were 58,546 violent incidents in the United States involving a gun in 2016 which resulted in 15,053 deaths. A joint investigation by the Associated Press and USA Today, found that during the first months of 2016 every other day a minor died as a result of an accidental shooting, either at their own hands or at the hands of other children or adults. (499) In the United States, there were 274 mass shootings in 2014, in 2016 the number of mass shootings increased to 384. (332) The two deadliest mass shooting in United States history occurred less than 16 months apart, the June 2016 Pulse nightclub shooting which killed 49 and injured 58 others, and the October 2017 Las Vegas Route 91 Harvest music festival shooting which killed 58 and injured 546. Then in November 2017, the deadliest shooting in Texas history occurred at a church leaving 26 dead and 20 others injured. Between 2013 and 2016, there were more than 200 school shootings in the United States. (334) Are the hundreds of mass shootings each year, and children taking guns to school and killing other children, not enough evidence that there is a major failure in government with regard to gun legislation? Why are a minority of tyrannical gun enthusiast allowed to put the rest of the population in potential danger? Are there not enough guns in existence, why must guns continue to be manufactured? When 4 United States Presidents have been assassinated by gunshots, 2 United States Presidents have been injured during attempted assassinations by gunshots, and others like John Lennon, Mahatma Gandhi, Martin Luther King Jr., Peter Tosh, and thousands of other peaceful *Homo sapiens* have also been assassinated or murdered in cold blood with a gun, is this not enough evidence there should be major reforms to gun legislation?

Guns are justified as being a part of freedom, for use to hunt animals, for protection, and crime prevention. In Spain, Cyprus, Hong Kong, China, Japan, Philippines, Taiwan, Germany, Greece, Romania, United Kingdom, Australia, and some other countries where gun legislation has been enacted to control and ban firearms, there are far lower rates of accidental shootings, mass shootings, armed robberies, murders, and other crimes committed with firearms. And yet in the United States where guns are legal more gun related crimes occur. Logical sensible *Homo sapiens* don't own guns, they call 911. Neighborhood watch groups were designed to be the eyes and ears of police and nothing more, now, where the laws allow, thousands of these trigger-happy volunteers pack a variety of guns. Trayvon Martin, who was unarmed, was murdered in 2012 by neighborhood watch volunteer George Zimmerman, a violent gun owner known to police with a prior history of violence with guns, who was also told to wait for police but did not.

Why are things like bump stocks legal? Why are the mentally ill allowed to own guns? Why are military style weapons even legal? What good are background checks if they aren't universal and can easily be circumvented through private sales? What purpose do guns ever serve other than to kill? Must one own a gun for protection, are the police not enough protection? Can society not simply educate and impress good morals onto itself to prevent crime? Do guns really symbolize freedom, or nothing more than paranoia and intimidation? Is there a real need for guns because of an old antiquated constitutional provision which allows the population to rise up against an old form of government, military, and police force? Is it even possible for today's society to rise up against the government and revolt, do these fanatical gun owners not see the impossibility of such an uprising, when the government with a much larger force and far superior weapons could so easily subdue any rebellion?

Martin Luther King Jr. wrote,

“They fail to see that no internal revolution has ever succeeded in overthrowing a government by violence unless the government had already lost the allegiance and effective control of its armed forces. Anyone in his right mind knows that this will not happen in the United States. In a violent racial situation, the power structure has the local police, the state troopers, the national guard and finally the army to call on...” (333)

Religion

Religions have attempted to help maintain the societal order and answer questions about the unknown, but have failed miserably for over 10,000 years. The exploitation of religious followers some by televangelist personalities like Jimmy Swaggart, Pat Robertson, Jim Bakker, Billy Graham, Jerry Falwell, Robert Schuller, Benny Hinn, Oral Roberts, and others is further clear evidence of how fraudulent these modern-day religions truly are. Religion has become just another business where a religion can make vast sums of money, usually in the form of cash, and always tax exempt. The economic value of religion in the United States alone is \$1,000,000,000,000 a year based on the revenues of faith-based organizations, the fair market value of goods and services provided by religious organizations, and on businesses with religious roots. (377) Do any of these devout worshipers ever question what their weekly tithing was spent on? How many billions of dollars has been wasted because of mismanagement, embezzlement, or other fraud? How many billions of dollars has been spent by the leaders of these religious organizations on their self-indulgent lifestyles?

Most religious leaders have also been silent and neutral when it comes to the destruction of Earth, and some even encourage it through the message they preach during their sermons, which continuously focuses on the inevitable pseudo apocalypse. If it ever happens at all, the end of days which the Bible and other religions speak of with the natural world destroying Earth and *Homo sapiens*, will only be the self-inflicted one which is created by *Homo sapiens* depredations. Some Christians even justify their depredations of Earth with Bible passages like Genesis 1:28 which states, ‘*God blessed them; and God said to them, “Be fruitful and multiply, and fill the earth, and subdue it; and rule over the fish of the sea and over the birds of the sky and over every living thing that moves on the earth.”*’ If one thinks the end of the world is coming, as many religious followers believe, what motivation do they have for being a good steward of Earth? If one believes that the Earth was given to them by God to do with what they please, how can they ever be expected to coexist on Earth? Religions talk of thou shalt not do this or that, and if you do then wrath of God will be brought down upon you, and yet most of these religious followers continuously destroy Earth. Is it not a contradiction to worship God, but then depredate the Earth which is God’s supposed creation? Would not their supposed God be more ecstatic if *Homo sapiens* treated the Earth with more respect and admiration for which it was created? How can religious *Homo sapiens* all in the name of greed, power, and progress willingly and hypocritically destroy a perfect creation like the Earth, which their supposed God created? Is it not disrespectful and sacrilegious in a sense to depredate the Earth which your supposed God created? Perhaps *Homo sapiens* have had so much fear of God instilled into them over several thousand years that it just doesn't matter anymore, and there is no true fear nor respect for their supposed God.

Some *Homo sapiens* appear to be abandoning traditional religions around the world and are seeking something more factual to believe in and ponder. Could a revived connection with nature help those with questions about the meaning of life to find the answers from within? Nature has what most everyone is seeking, truth and purity, and this will never be matched by the religious creations of *Homo sapiens*. Perhaps one-day *Homo sapiens* will acknowledge this, coexist on Earth, and learn from it. Maybe a new religion will emerge in the near future based on nature and the environment. If this new type of environmental based religion does emerge and takes hold anywhere near the way religions of the past have, it would bring billions of *Homo sapiens* back to their roots with nature and perhaps initiate more coexistence on Earth. Perhaps *Homo sapiens* will fully abandon the current religions after thousands of years like the mythological and sacrificial religions before them. As of 2010, estimated religious statistics for the world were: Christian 31.4%, Muslim 23.2%, Hindu 15%, Buddhist 7.1%, folk religions 5.9%, Jewish 0.2%, other 0.8%, unaffiliated 16.4%. But it should also be noted, that some of those who claim a religious affiliation do not practice the religion actively and are simply responding to the question with the religion that was forced on them as a child. The unaffiliated percentage has steadily risen over time and will perhaps be the majority in the near future. (124) In 2011, Daniel M. Abrams, Haley A. Yapple, and Richard J.

Wiener released, *'Dynamics of Social Group Competition: Modeling the Decline of Religious Affiliation'*, in it, they stated,

"People claiming no religious affiliation constitute the fastest growing religious minority in many countries throughout the world. Americans without religious affiliation comprise the only religious group growing in all 50 states; in 2008 those claiming no religion rose to 15% nationwide, with a maximum in Vermont at 34%. In the Netherlands nearly half the population is religiously unaffiliated."

"We found that a particular case of the solution fits census data on competition between religious and irreligious segments of modern secular societies in 85 regions around the world. The model indicates that in these societies the perceived utility of religious nonaffiliation is greater than that of adhering to a religion, and therefore predicts continued growth of nonaffiliation, tending toward the disappearance of religion." (614)

It all began with the enlightenment or intellectual movement which spawned out of the Renaissance era 500 years ago, it was the beginning of favoring rational inquiry over the long-established dogma, science along with logic, truth, and knowledge could be suppressed no more. Science will ultimately succeed in the end, because of scientists and philosophers which are logical and rational in their thinking. (e.g. Lucretius, Hippocrates, Pythagoras, Socrates, Aristotle, Plato, Copernicus, Spinoza, Galileo, Kepler, Newton, Darwin, Einstein, and so many others) Some of them spent time in jail, exile, or were killed as a result of their work. Today thanks to these pioneers of science and logical thought, and even modern-day specialty debunkers, all pseudo things like religions, pseudoscience, myths, wise tales, rumors, hoaxes, and the like are eventually replaced with the truth through logical thought and scientific factual evidence. Will science, knowledge, the power of the Internet, and time result in less mainstream religions and eventually make them just another thing of the past like Greek mythology? Perhaps the charlatans, fear-mongers, alarmists, and other *'Franz von Walseggs'* of the world who perpetuate these lies will also disappear with time as well. What would the world be like if every religious follower first read Thomas Paine's *'The Age of Reason'* before so blindly following such religions?

Some *Homo sapiens* still possess an Orthodox or other religious viewpoint about society, Earth, and even the Universe. Religion based purely on faith discourages logic and seems to ignore it as if it isn't applicable. A future observer might see this as foolish, given *Homo sapiens* level of technological and scientific advancements over the last 100 years. One can understand science and believe that something created the entire universe, call it God or whatever name suits you, but the question will forever linger as to what created the creator, and thus the God and creation loop is forever infinite. And it is precisely this type of uncertainty which perpetuates religions still to this day, as most all religions are based not on fact, but on faith in fiction, superstition, myth, magic, or mysticism. In 1930, Albert Einstein wrote an article about religion and science for the New York Times Magazine, in it he made the following remarks,

"In this sense I am speaking of a religion of fear. This, though not created, is in an important degree stabilized by the formation of a special priestly caste which sets itself up as a mediator between the people and the beings they fear, and erects a hegemony on this basis. In many cases a leader or ruler or a privileged class whose position rests on other factors combines priestly functions with its secular authority in order to make the latter more secure; or the political rulers and the priestly caste make common cause in their own interests."

"But there is a third stage of religious experience which belongs to all of them, even though it is rarely found in a pure form: I shall call it cosmic religious feeling. It is very difficult to elucidate this feeling to anyone who is entirely without it, especially as there is no anthropomorphic conception of God corresponding to it."

The individual feels the futility of human desires and aims and the sublimity and marvelous order which reveal themselves both in nature and in the world of thought. Individual existence impresses him as a sort of prison and he wants to experience the universe as a single significant whole."

"The religious geniuses of all ages have been distinguished by this kind of religious feeling, which knows no dogma and no God conceived in man's image; so that there can be no church whose central teachings are based on it. Hence it is precisely among the heretics of every age that we find men who were filled with this highest kind of religious feeling and were in many cases regarded by their contemporaries as atheists, sometimes also as saints. Looked at in this light, men like Democritus, Francis of Assisi, and Spinoza are closely akin to one another."

How can cosmic religious feeling be communicated from one person to another, if it can give rise to no definite notion of a God and no theology? In my view, it is the most important function of art and science to awaken this feeling and keep it alive in those who are receptive to it."

"The man who is thoroughly convinced of the universal operation of the law of causation cannot for a moment entertain the idea of a being who interferes in the course of events provided, of course, that he takes the hypothesis of causality really seriously. He has no use for the religion of fear and equally little for social or moral religion. A God who rewards and punishes is inconceivable to him for the simple reason that a man's actions are determined by necessity, external and internal, so that in God's eyes he cannot be responsible, any more than an inanimate object is responsible for the motions it undergoes. Science has therefore been charged with undermining morality, but the charge is unjust. A man's ethical behavior should be based effectually on sympathy, education, and social ties and needs; no religious basis is necessary. Man would indeed be in a poor way if he had to be restrained by fear of punishment and hope of reward after death.

It is therefore easy to see why the churches have always fought science and persecuted its devotees. On the other hand, I maintain that the cosmic religious feeling is the strongest and noblest motive for scientific research. Only those who realize the immense efforts and, above all, the devotion without which pioneer work in theoretical science cannot be achieved are able to grasp the strength of the emotion out of which alone such work, remote as it is from the immediate realities of life, can issue. What a deep conviction of the rationality of the universe and what a yearning to understand, were it but a feeble reflection of the mind revealed in this world, Kepler and Newton must have had to enable them to spend years of solitary labor in disentangling the principles of celestial mechanics! Those whose acquaintance with scientific research is derived chiefly from its practical results easily develop a completely false notion of the mentality of the men who, surrounded by a skeptical world, have shown the way to kindred spirits scattered wide through the world and the centuries. Only one who has devoted his life to similar ends can have a vivid realization of what has inspired these men and given them the strength to remain true to their purpose in spite of countless failures. It is cosmic religious feeling that gives a man such strength. A contemporary has said, not unjustly, that in this materialistic age of ours the serious scientific workers are the only profoundly religious people." (58)

Most religions have also helped to bring about a false justification of patriarchy, with God so often referred to as 'He' and never 'She'. Most religions are nothing more than a tyrannical form of control based on faith and fear of the unknown, and religions have always used their power to control or in an attempt to control *Homo sapiens*. How can billions of *Homo sapiens* still follow these mainstream antiquated religions that have committed so many horrendous deeds over the last 2,000 years? Do these followers not know the history of their religion which they follow so blindly? How can one follow and believe in such a hypocrisy that has done nothing more than suppress and exploit *Homo sapiens* throughout history? Why would anyone follow a religion which has a known history of cruelty, murder, prejudice, and deception? Perhaps more research of the factual historic evidence would enlighten followers to how truly evil the religions they worship are. Since 2004, more than 3,400 credible cases of sexual abuse towards children by Catholic priests have been reported to the Vatican. And although there is irrefutable evidence and even confessions in some cases, only a small number of these priests have gone to trial and have avoided true justice in a court of law. Instead the Vatican has delivered pseudo justice in the form of 848 priests having been defrocked, or returned to the lay state, and another 2,572 have been given a lifetime of penance and prayer or another lesser sanction. (485) Between 2007 and 2015, the New York Catholic Conference spent more than \$2,100,000 on lobbying, in part to work on blocking child-sex law reforms involving the statute of limitations and timelines for commencing certain civil actions related to sex offenses. (486) It is interesting to examine the perspective of Christianity by that of a non-believer and who does not take part in organized religion, a perspective like that of an Indian such as Ishi. Theodora Kroeber wrote that,

"Christian doctrine interested him, and seemed to him to be for the most part reasonable and understandable. He held to the conviction that the White God would not care to have Indians in His home, for all Loudy told him to the contrary. It may have occurred to him that the souls of white men would fit but poorly into a round dance of Yana dead. If so, he was too polite to say so...When Ishi saw the cinema of Passion Play, which moved him and which he found beautiful, he assumed that Christ was the "badman" whose crucifixion was justified." (100)

If *Homo sapiens* are to ever truly progress forward as a whole, traditional religions will most likely need to be abandoned completely. The time and energy that *Homo sapiens* would acquire by the abandonment of these time consuming pointless activities would be exponential. What could be accomplished if instead of wasting time worshiping and idolizing myths for hours on end, individuals became more scientifically educated, devoted time to resolving social issues, or helped to clean-up Earth? Billions of minds are simply waiting to be exposed to scientific truth and knowledge, and perhaps when that happens the scientific disciplines will have far more input

from additional minds helping to unravel the scientific mysteries of the universe. In 1941 at a Symposium on science, philosophy, and religion Albert Einstein said,

"The further the spiritual evolution of mankind advances, the more certain it seems to me that the path to genuine religiosity does not lie through the fear of life, and the fear of death, and blind faith, but through striving after rational knowledge." (60)

By definition, all religions are cults, and they engage in deception, brainwashing, and other manipulative actions over their followers, and it is nothing more than fear and ignorance which perpetuates these religions.

Organizations like Scientology, Aryan Nations, Branch Davidians, Heaven's Gate, Unification Church, Peoples Temple, and thousands of other groups claim or claimed to be religions, and yet they have been known or were known to engage in either racism, terrorism, follower abuse, harassment, extortion, or other illegal activities. Even more ludicrous are some of the foundations these cults are based on, like extraterrestrials and doomsday prophecies. L. Ron Hubbard's scientology uses alien Gods named Xenu and Raël, which founded the Raëlism cult on his supposed December 13, 1973 encounter with an extraterrestrial. How can an organization like Scientology be allowed to operate so secretly posing as a religion, when they are known to engage in criminal activities? The documentary series '*Leah Remini: Scientology and the Aftermath*' 2016, explains exactly how this modern-day cult manipulates its followers and seeks to destroy its critics. These negative cults are allowed to thrive while the followers of positive and peaceful spiritual practices like Tibetan Buddhism and Falun Gong are persecuted, jailed, and even executed by the Chinese government. Robert Pirsig wrote,

"An insane delusion can't be held by a group at all. A person isn't considered insane if there are a number of people who believe the same way. Insanity isn't supposed to be a communicable disease. If one other person starts to believe him, or maybe two or three, then it's a religion."

"The current subject-object point of view of religion, conventionally muted so as not to stir up the fanatics, is that religious mysticism and insanity are the same. Religious mysticism is intellectual garbage. It's a vestige of the old superstitious Dark Ages when nobody knew anything and the whole world was sinking deeper and deeper into filth and disease and poverty and ignorance. It is one of those delusions that isn't called insane only because there are so many people involved." (428)

The occult has been in existence longer than modern religions and is still practiced by millions around the world today in some lesser form than that of 5,000 years ago. The ancient Egyptians are thought to have worshipped faunae so much so that they imagined them as Gods, mummifying millions of cats, birds, and other faunae. Even today occultists focus on bizarre foolish magical rituals sometimes involving the sacrifice of living flora or fauna. Occultists often claim to have some connection to the Universe or nature and attempt to derive powers from nature by offering nature itself as the sacrifice, but they in fact do not respect nature and cannot derive any powers from nature, nor do they have any magical or special connection to it.

Instead of worshiping, idolizing, and celebrating antiquated religions, perhaps future generations will celebrate the beauty, perfection, diversity, and evolutionary brilliance within nature. Nature is capable of giving *Homo sapiens* enlightenment on a scale far greater than any religion could ever come close to. If one wants to meet God or go to church, go out into the wilds of nature and meet God up close and personal, it was all scientifically engineered to perfection using the laws of nature, and you can get no closer to a God if one exists. Nature and everything contained in the Universe is a direct result of a perfect formula and is an example of the only true perfection which is possible throughout the Universe. God if it exists, could be best described as a naturalist with an extremely logical thought process which set the Universe itself into motion and is allowing things to evolve without intervention, for none is necessary, as the laws of nature and that which make up the Universe are perfect, and evidence of this can be seen in every aspect of nature and even the Universe itself. One need only look at nature to see the beauty and perfection with which it has evolved into over billions of years. Thomas Paine wrote,

"All the knowledge man has of science and of machinery, by the aid of which his existence is rendered comfortable upon earth, and without which he would be scarcely distinguishable in appearance and condition from a common animal, comes from the great machine and structure of the universe. The constant and unwearied observations of our ancestors upon the movements and revolutions of the heavenly bodies, in what are supposed to have been the early ages of the world, have brought this knowledge upon earth. It is not Moses and the prophets, nor Jesus Christ, nor his apostles, that have done it. The Almighty is the great mechanic of the creation; the first philosopher and original teacher of all science. Let us, then, learn to

reverence our master, and let us not forget the labors of our ancestors.

Had we, at this day, no knowledge of machinery, and were it possible that man could have a view, as I have before described, of the structure and machinery of the universe, he would soon conceive the idea of constructing some at least of the mechanical works we now have; and the idea so conceived would progressively advance in practice. Or could a model of the universe, such as is called an orrery, be presented before him and put in motion, his mind would arrive at the same idea. Such an object and such a subject would, while it improved him in knowledge useful to himself as a man and a member of society, as well as entertaining, afford far better matter for impressing him with a knowledge of, and a belief in, the Creator, and of the reverence and gratitude that man owes to him, than the stupid texts of the Bible and of the Testament from which, be the talents of the preacher what they may, only stupid sermons can be preached. If man must preach, let him preach something that is edifying, and from texts that are known to be true.

The Bible of the creation is inexhaustible in texts. Every part of science, whether connected with the geometry of the universe, with the systems of animal and vegetable life, or with the properties of inanimate matter, is a text as well for devotion as for philosophy-for gratitude as for human improvement. It will perhaps be said, that if such a revolution in the system of religion takes place, every preacher ought to be a philosopher. Most certainly; and every house of devotion a school of science." (630)

How can *Homo sapiens* engage in religions when they are based on such an obvious lie and on faith and not fact? What would the world be like if *Homo sapiens* simply respected Earth and the other species which inhabit the planet instead of practicing illogical religions? What would religious followers be like if they simply spent time in nature instead of going to church on Sunday? The majority of religions around the world be it Christianity, Judaism, Islam, or other place no real emphasis on the natural world, which is the purest connection that one can have with God or the Universe at large. What would the world be like today if society had not tried to make God a reflective image of *Homo sapiens*, and instead understood nature as the true and only reflection of God that exists on Earth? How much more enlightened would the world be if more children were given the scientific truth to read versus fictional biblical entertainment? Why can't more *Homo sapiens* see the scientific brilliance with which the Universe was created? Does not Darwin's '*On the Origin of Species by Means of Natural Selection*' disprove all the organized religions through the scientific evidence of evolution? Albert Einstein said,

"The most beautiful experience we can have is the mysterious. It is the fundamental emotion which stands at the cradle of true art and true science. Whoever does not know it and can no longer wonder, no longer marvel, is as good as dead, and his eyes are dimmed. It was the experience of mystery-even if mixed with fear-that engendered religion. A knowledge of the existence of something we cannot penetrate, our perceptions of the profoundest reason and the most radiant beauty, which only in their most primitive forms are accessible to our minds-it is this knowledge and this emotion that constitute true religiosity; in this sense, and in this alone, I am a deeply religious man. I cannot conceive of a God who rewards and punishes his creatures, or has a will of the kind that we experience in ourselves. Neither can I nor would I want to conceive of an individual that survives his physical death; let feeble souls, from fear or absurd egoism, cherish such thoughts. I am satisfied with the mystery of the eternity of life and with the awareness and a glimpse of the marvelous structure of the existing world, together with the devoted striving to comprehend a portion, be it ever so tiny, of the Reason that manifests itself in nature." (53)

Furthermore, Albert Einstein said,

"What is the meaning of human life, or, for that matter, of the life of any creature? To know an answer to this question means to be religious. You ask: Does it make any sense, then, to pose this question? I answer: The man who regards his own life and that of his fellow creatures as meaningless is not merely unhappy but hardly fit for life." (53)

The destructive godlike mentality which some *Homo sapiens* have in thinking that they can do anything, including depredate Earth, must be changed if true progress for humanity is to ever be made. To be born into this world and assume that it is rational and logical that *Homo sapiens* are Godlike creatures on Earth is a very erroneous assumption to make. Religions have only led *Homo sapiens* in a negative direction and down path of lies for thousands of years. To follow a mythical legend passed down for thousands of years and not ever question or even research history is a disservice to the self. Religion has been so good at brainwashing followers it's no wonder that more *Homo sapiens* have not seen the facade which has been perpetuated for thousands of years. The traditional religions have been proven again and again to be antiquated through scientific facts and simple logic, but they have always managed to adapt their teachings to include evolution and other selected parts of science which can be interwoven to be included into their web of lies. Even if extraterrestrials came down from outer space organized religious followers would most likely say it was the devil or just another thing God

was doing to test their faith. In what Albert Einstein referred to as the '*Religious Spirit of Science*' he wrote,

But the scientist is possessed by the sense of universal causation. The future, to him, is every whit as necessary and determined as the past. There is nothing divine about morality; it is a purely human affair. His religious feeling takes the form of a rapturous amazement at the harmony of natural law, which reveals an intelligence of such superiority that, compared with it, all the systematic thinking and acting of human beings is an utterly insignificant reflection. This feeling is the guiding principle of his life and work, in so far as he succeeds in keeping himself from the shackles of selfish desire. It is beyond question closely akin to that which has possessed the religious geniuses of all ages." (59)

Perhaps in the near future, through science, all religions will finally be definitively proven impossible and shown for what they truly are, which is nothing more than a fallacy. The fatal flaw with most religions is that they are based on legends and rely on the faith of the ignorant to survive. Most religions are still relying on old conquest and conversion tactics which only work on their ignorant naïve followers. Some use simple logical deductions combined with scientific thought based on all known scientific knowledge, factual and theoretical, to formulate a more original and meaningful postulation about religion and the meaning of life. Perhaps in the future religion will be based on facts and become something more meaningful by doing far more positive things within society and for the conservation of Earth. What a waste of life when one thinks of all the millions of *Homo sapiens* who have been tortured, murdered, sacrificed, or were martyrs all in the name of a God that that was created by *Homo sapiens*. Religions no longer have ultimate power over *Homo sapiens* and they can no longer suppress and destroy knowledge, nor imprison or murder the scientists who progress that knowledge.

Most all ancient religions that past cultures invented throughout history worshiped the powers of nature, but it was more of a respect based on fear, and not reverence based on coexistence. The irony is, that after 10,000 years *Homo sapiens* have again come full circle to the source of it all, nature. There is nothing wrong with some of the ethics which have been taught through religions, but one could just as easily get a moral standard from a philosophy like Confucianism, which existed 500 years before Jesus and 1,000 years before Muhammad. As Confucianism is purely philosophical and non-religious, it has been described as definitively pantheistic, nontheistic, and humanistic. Perhaps it will be by rediscovering this ancient philosophy that will help to change *Homo sapiens* ethics, or perhaps it will be through New Age shamanistic works like Carlos Castaneda's 12 book series with don Juan Matus which draws on many ancient religious concepts. Society and future generations already appear to be gravitating towards a Confucianism and humanism type society as any observer can clearly see by societies focus on knowledge, science, history, human rights, freedom, and truth. What would the world be like if everyone lived by the simple Ahimsa virtue of nonviolence and respected all living things? Have the plethora of new social activities already begun to substitute traditional religious activities? Are celebrities now worshiped more than Jesus? Is social media being used more than the Bible? Has entertainment and technology already begun to replace mainstream religions?

Suppression of History and Knowledge

History has often been written by the winners of wars. The destruction of art and history has been done throughout history by conquering tyrants or by the religions which backed them, and it was usually done out of unwarranted fear, in order to spread lies, erase history and truth, and ultimately to convert the now ignorant humble masses to follow the new ruler and a new faith. These tyrants and religious fanatics have always attempted to silence the truth by controlling knowledge and rewriting history. And although they have erased some history, they have all failed in the end and only made the thirst for truth and knowledge even stronger. How much more advanced and enlightened would humanity be if science and history would have not been suppressed so much throughout history? How much history and knowledge was suppressed and erased all in the name of religion and politics? What type of art could have been created by Michelangelo and other artists if they would have had total creative freedom instead of religious tyrants forcing them to create religious art works based on myth?

The Library of Alexandria containing thousands of scrolls and books, was destroyed partially or completely several times throughout history. The amount of history and knowledge that was destroyed in the New World by the conquistadors and the Catholic priests which accompanied them is incalculable. Of the thousands of Maya

Codices that once existed, only the Madrid Codex, Dresden Codex, and Paris Codex now remain, and other ancient knowledge like the Rongorongo glyphs were also destroyed. Recent history witnessed 3,000 books from the Library of Congress used by the English to ignite the United States Capitol during the Burning of Washington in 1813. In 1873 fanatical petty tyrant Anthony Comstock founded the New York Society for the Suppression of Vice, and managed to burn 15 tons of books, 284,000 pounds of plates for printing books, and nearly 4,000,000 pictures he deemed lewd. Between 1933 and 1945, the Nazi regime burned millions of books, many were only copies, but some were not. Also included in these Nazi burnings were the personal papers, art, photos, letters, journals, and other writings of many individuals. An eccentric scientist Wilhelm Reich may have been, but it did not justify the destruction of his invention, nor the burning of his 6 tons of books and papers by the United States government in 1957. In 1973, the Chilean fascist dictator Augusto Pinochet burned hundreds of books to foster repression and censorship. In 1981, the Sinhalese police and paramilitaries burned the Jaffna Public Library in Sri Lanka, resulting in the loss of nearly 100,000 Tamil books and rare documents. As of 2017, the Texas Department of Criminal Justice was still banning some 10,000 published titles from the nearly 150,000 inmates which reside in the state prison system. (611) How could a country with rights guaranteeing freedom of speech and thought still be engaged in such blatant censorship?

There will always be those who spread the truth with comedy like Bill Hicks, George Carlin, Richard Pryor, Howard Stern, Lenny Bruce, and others, and there have always been those who have attempted to censor this speech. How can freedom of speech be in the foundation of a constitution, while the United States Federal Communications Commission, which is an appointed not elected division of the government, is allowed to censor and regulate free speech over broadcasting with their indecency codes? How can language be filtered on public television, radio, and other mediums by the Federal Communications Commission (FCC) when this clearly violates freedom of speech? What right does a government have to censor a set of words that a religious minority has deemed indecent, when in reality the words are simply a form of expression? The Internet which is rapidly replacing radio and television broadcasting will ultimately put an end to this censorship, as there is no way to truly regulate and enforce censorship in the vastness of cyberspace, and any attempts have for the most part been thwarted by citizen protests thus far. Why have these language censorship laws not been repealed as the Internet has definitively made these laws obsolete?

Information will never be controlled or eliminated through censorship, it will only make *Homo sapiens* seek it out even further, and censorship efforts like the '*Index Librorum Prohibitorum*' by the Roman Catholic Church will always fail and often will have the opposite effect making the censored work even more popular. There have always been dissident activities when there is censorship, like Russian samizdat and similar underground information networks, and now with the Internet there is no chance of traditional censorship ever happening again. If anything, the truth of the future might be censored by the sea of false information which now seems so prevalent in some parts of the Internet. But this form of censorship cannot happen if one is able to see through the veil of lies, and find the truth through the individuals and organizations who make this truth easier to find. An observer of today's society might see that the current society members will never be controlled through censorship or by big brother, but rather by corporations, greed, necessity, money, indulgence, and pleasure. In describing Aldous Huxley's '*Brave New World*' versus George Orwell's '*1984*', Neil Postman wrote,

"...no Big Brother is required to deprive people of their autonomy, maturity and history. As he saw it, people will come to love their oppression, to adore the technologies that undo their capacities to think.

What Orwell feared were those who would ban books. What Huxley feared was that there would be no reason to ban a book, for there would be no one who wanted to read one. Orwell feared those who would deprive us of information. Huxley feared those who would give us so much that we would be reduced to passivity and egoism. Orwell feared that the truth would be concealed from us. Huxley feared the truth would be drowned in a sea of irrelevance. Orwell feared we would become a captive culture. Huxley feared we would become a trivial culture, preoccupied with some equivalent of the feelies, the orgy porgy, and the centrifugal bumblepuppy."

"In 1984, Huxley added, people are controlled by inflicting pain. In *Brave New World*, they are controlled by inflicting pleasure. In short, Orwell feared that what we hate will ruin us. Huxley feared that what we love will ruin us." (370)

Education and The Monetary Value of History and Knowledge

Education and history have become just another avenue to generate money and make huge profits from. College education in the United States and some other western countries has become based around profits and not education. In 2017, Student loan debt in the United States was \$1,400,000,000,000 an increase of 170% from 10 years ago. 44,000,000 Americans have student debt with 8,000,000 of the borrowers in default. (320) In 2016, U.S. college graduates that utilized student loans had an average debt of \$37,173 a 6% increase from 2015. (423) The vast majority of museums and historical monuments in the world charge an entrance fee to access history. Does this history not belong to all the *Homo sapiens* of Earth? Shouldn't all museums and historical monuments give free admission, so everyone can view and learn from them at any time? Some access to the truth and written scientific knowledge which is published online is controlled with monetary based subscriptions, college level education can be expensive and limited, and even the Internet is censored with filters by some countries and service providers. How can the world learn when the knowledge and history can only be accessed by some and not all? Should not all education at every level be freely available to anyone willing to learn? Why can't all college classes be broadcast live via the Internet for free allowing anyone in the world access to the them? How much more intelligent would many *Homo sapiens* be if they had access to the Ivy League type curriculums and other educational resources where access is limited? Why are most primary, middle, and high schools free and paid for by the government, while most colleges are independent private-sector institutions which are not only limited to many for various reasons, but are also focused more on money and not in increasing and diffusing knowledge?

Education has always been forced onto citizens ever since Plato first popularized compulsory education. Even today, all United States citizens, beginning as early as age 5 until 18 years of age, are required by law to go to some form of schooling either at a public school, private school, or homeschool to be taught the government approved standard curriculum. This forced education can create a sort of prison for some students and potentially lead to anxiety, stress, and even depression. Bullying is not uncommon and is very often unescapable in such a confined setting. Education can also be a tool of subversion when students are not taught the truth but are instead taught lies and a distorted history based on the religious or political ideology of the teacher or school. Would students not perhaps have more interest in education if they were able to choose what they wanted to study and where they wanted to study it? What would students be like if more schools practiced the Montessori educational approach or something similar? Will *Homo sapiens* become self-educated through the Internet and abandon traditional schools entirely in the future?

Today it seems that many individuals know more and more about less and less, focusing on a tiny fraction of the whole and missing out on the larger scope of things. Their knowledge of history and of scientific facts are minimal if not non-existent unless it applies to their daily activities. Many *Homo sapiens* know more about the previous 24 hours than about anything else, and often what they do know in regard to science and history are useless trivial entertainment related facts. Neil Postman wrote,

"This coincidence suggests that the new technologies had turned the age-old problem of information on its head: Where people once sought information to manage the real contexts of their lives, now they had to invent contexts in which otherwise useless information might be put to some apparent use. The crossword puzzle is one such pseudo context; the cocktail party is another; the radio quiz shows of the 1930's and 1940's and the modern television game show are still others; and the ultimate, perhaps, is the wildly successful "Trivial Pursuit." In one form or another, each of these supplies an answer to the question, "What am I to do with all these disconnected facts?" And in one form or another, the answer is the same: Why not use them for diversion? for entertainment? to amuse yourself, in a game?...A pseudo context is a structure invented to give fragmented and irrelevant information a seeming use. But the use the pseudo context provides is not action, or problem-solving, or change. It is the only use left for information with no genuine connection to our lives. And that, of course, is to amuse. The pseudo context is the last refuge, so to say, of a culture overwhelmed by irrelevance, incoherence, and impotence." (676)

The Slaughter, Slavery, and Forced Assimilation of Indigenous *Homo sapiens*

For thousands of years many indigenous *Homo sapiens* lived in peace and coexisted with nature and each other, living a very simplistic lifestyle. And even though some of their pseudo religious views were bizarre, their politics they practiced are perhaps somewhat antiquated, and ultimately, they all collapsed for one reason or another, it is their minimalist lifestyle, morals, and connection with nature shown in their respect for Earth,

which modern societies could perhaps learn and benefit most from. Some indigenous viewed civilization itself and societies disconnection with nature as the problems, Theodora Kroeber wrote,

“He considered the white man to be fortunate, inventive, and very, very clever; but childlike and lacking in a desirable reserve, and in a true understanding of Nature-her mystic face; her terrible and her benign power.”

“Tshi felt quite sure that he knew the chief causes for men's sickening in civilization. They were, briefly, the excessive amount of time men spent cooped up in automobiles, in offices, and in their own houses. It is not a man's nature to be too much indoors...” (656)

When the Spanish, French, Portuguese, English, and other European empires sent expeditions to the New World they were not on a mission of peace or scientific discovery, they were on one of conquest. They did not seek peace with the Indigenous *Homo sapiens* initially, and there was only temporary peace obtained briefly at times, and this was usually broken on the part of the European not the indigenous. Alcohol was introduced to the indigenous which had a devastating impact turning many into drunkards, as they had built up no tolerance like the Europeans who had consumed alcohol for thousands of years. The invaders brought with them not only new vices, but new diseases as well like chicken pox, dysentery, influenza, malaria, measles, typhus, smallpox, pneumonia, tuberculosis, typhoid, and others. Before even making contact with the invaders many indigenous *Homo sapiens* were killed by these diseases introduced by the Spanish, hence these diseases did much of the genocide rather than the actual hands of the conquistadors. Christians regarded the conquests as simply another opportunity to convert more *Homo sapiens* and gain more followers. The proselytizing of indigenous *Homo sapiens* throughout the world resulted in many older and alternative religions being destroyed and lost forever. Culture, history, and knowledge were exterminated all in the name of conquest and Christianity. Ina Corrine Brown wrote,

“People can and do modify and change their social patterns but when whole peoples are ruthlessly separated from their past the result is almost always disorganization and deterioration. We have seen this cultural breakdown in peoples who somehow seemed to lose the will to live and who literally died out under the impact of conquest that took all the meaning out of life. We have seen it in the pathetic deterioration of many once proud Indian tribes whose cup of life was broken under the impact of the white man. We have seen it, too, in American Negros, robbed of their African heritage and prevented from accepting full the new heritage that was being forged as a part of the American dream. We are seeing it today take a new form as totalitarian governments consciously and ruthlessly go about making other peoples over in their own image.” (22)

When De Soto explored America between 1539 and 1542, he left a wake of destruction and bodies in his path while also enslaving the mostly peaceful Mobilian Indian tribes of the southeastern United States. D. H. Montgomery wrote,

“It was 'a roving company of gallant freebooters,' in search of fortune. De Soto had provided bloodhounds and chains to hunt and enslave the Indians...

The expedition landed at Tampa Bay, and began its march of exploration, of robbery, and of murder. The soldiers seized the natives, chained them in couples so that they might not escape, and forced them to carry their baggage and pound their corn. The chief of each tribe through whose country they passed was compelled to serve as a guide until they reached the next tribe. If an Indian refused to be as slave or a beast of burden for these insolent Spaniards, his fate was pitiful. They set him up as a target, and riddled his body with bullets; or they chopped off his hands, and then sent him home to exhibit the useless, bleeding stumps to his family.

They found no gold worth mentioning; but in its stead, hunger, suffering, and death. They deserved what they found...they were a miserable band, half-naked, half starved, looking worse than the savages they had gone out to subdue.” (48)

Although colonialism forcibly assimilated and destroyed many ancient cultures of the Americas, to this day many Spaniards refer to their ancestors as discoverers, and there is still a major holiday, Columbus Day, celebrated in Spain, Italy, and most United States cities. There are many monuments, parks, roads, cities, and other things throughout the world named after Christopher Columbus, and there is even a hospital in Madrid, Spain commemorating the day when Columbus reached the New World, ‘*Hospital Universitario 12 de Octubre*’. Some Spaniards, Americans, French, and British, regard the conquests and colonialism of their ancestors as a good and justifiable act. But the true nature of the conquistadors and of all European empires of the colonialism era which followed, was that it was nothing more than an inhumane conquest and forced assimilation of another

society and culture. In some schools it is taught that Christopher Columbus was on a scientific mission of discovery, and not one of conquest, they do not focus on the reality and truth of what occurred from 1492 and continues to have a rippling effect still today with so many indigenous *Homo sapiens* throughout the world. Theodora Kroeber wrote,

“We have been taught to regard with pride the courage and ingenuity of these ancestors, their stubbornness in carving out a good life for their children. It is neither meet nor needful to withdraw such affectionate respect and admiration; it is perhaps well to remind ourselves that the best and gentlest of them did not question their right to appropriate land belonging to someone else, if Indian- the legal phrase was “justifiable conquest.” However broad and real governmental and popular approval was, this invasion was like the classic barbarian invasions-forced intrusion upon a settled population, and its replacement by the intruders. Such invasions have occurred many times, and continue to occur in the history of mankind, but also as well in the history of all forms of life; they are a part of the biological urge of each plant and animal to make or to take a place for itself and its descendants. Invasion, then, is a necessitous act in the Darwinian sense of struggle and survival; it is instinctive, primitive, and in itself inhumane.” (98)

And Martin Luther King Jr. reiterated this message when he wrote,

“In dealing with the ambivalence of white America, we must not overlook another form of racism that was relentlessly pursued on American shores: the physical extermination of the American Indian. The South American example of absorbing the indigenous Indian population was ignored in the United States, and systematic destruction of a whole people was undertaken. The common phrase, “The only good Indian is a dead Indian,” was virtually elevated to national policy. Thus the poisoning of the American mind was accomplished not only by acts of discrimination and exploitation but by the exaltation of murder as an expression of the courage and initiative of the pioneer. Just as Southern culture was made to appear noble by ignoring the cruelty of slavery, the conquest of the Indian was depicted as example of bravery and progress.” (653)

Some of the original colonist respected the indigenous and attempted to live peacefully with them, in fact the indigenous held them in high regard. In 1635, a minister named Roger Williams defied the King of England and sided with the indigenous, eventually prevented a massacre of the colonist in Boston. D. H. Montgomery wrote,

“Mr. Williams denied that the king had any power to give them the land, because it belonged first of all to the Indians. This was a new and startling way of looking at things, and the colonist feared that free utterance of this king might provoke the English sovereign to take away their charter. Roger Williams was ordered (1635) to leave the colony. Later, an attempt was made to arrest him and send him to England. Williams escaped. It was winter and the weather was bitterly cold. The fugitive took refuge among the Indians, who fed and sheltered him.”

“The Pequots, an Indian tribe of Connecticut, were plotting a massacre of the white settlers of that part of the country, and were trying to stir up the Narragansetts to attack Massachusetts. Williams used his influence with the latter tribe to such good effect that they refused to fight. Thus the exiled minister was probably the means of saving the people of Boston and surrounding towns from the horrors of an Indian war.” (68)

In 1682, the original Quakers of Pennsylvania lived peacefully with the indigenous, with William Penn creating a treaty which Voltaire described as, “The only treaty which was never sworn to, and never broken.” D. H. Montgomery wrote,

“According to tradition he met the Red Men under the branches of a wide-spreading elm in what was then the vicinity of Philadelphia. There solemn promises of mutual friendship were made. In accordance however, with the principles of the Quaker faith, no oaths were taken. Each trusted the other's simple word. That treaty was “never broken,” and for sixty years, or as long as the Quakers held control, the people of Pennsylvania lived at peace with the natives.” (69)

So, there was a brief period in American history when some of the colonist coexisted with the indigenous, and these colonists wanted a simple peaceful lifestyle, living in harmony with nature like the indigenous and to be unmolested by the tyrants they fled from in Europe. But as further history shows, eventually more pervasive tyrannical greedy colonist with unwarranted fear and hostility towards the indigenous prevailed, and forced assimilation was inevitable. The treaties from this point were meaningless and most often broken by the colonist, and yet, even still, in spite of all the death and destruction, many indigenous still assisted the Europeans, saving their lives in many instances from starvation and other aggressive indigenous, hospitably welcoming them into their lands. Even to this day, most indigenous do not harbor anger, perhaps sadness, as they still attempt to coexist with the descendants of their conquerors.

The Maya did not see the Spanish conquistadors as friends or as a new and improved future, to the contrary they in fact saw it as a vice, and as the beginning of the end to their culture and lifestyle. The conquerors destroyed the Maya and introduced many negative societal elements which were previously unknown to them. J. Eric Thompson describes the first-hand account of a Mayan scribe regarding the Spanish Conquest in writing,

“Of the changes resulting from the Spanish Conquest the Maya Scribe writes: Before the coming of the mighty men and Spaniards there was no robbery by violence, there was no greed, and striking down one's fellow man in his blood, at the cost of the poor man, at the expense of the food of each and everyone. [And elsewhere] It was the beginning of tribute, the beginning of church dues, the beginning of strife with purse snatching, the beginning of strife with guns, the beginning of strife by trampling of people, the beginning of robbery with violence, the beginning of debts enforced by false testimony, the beginning of individual strife, a beginning of vexation.” (27)

Most today have never even heard of Ishi, nor the millions of other indigenous *Homo sapiens* the world over who were slaughtered and victimized during the Caucasian invasions. Ishi has long since been forgotten by most and is just another footnote in the too often overlooked censored history of America and the genocide of indigenous *Homo sapiens* by the Europeans. Ishi was a Yahi from California, and the last free indigenous to be forcibly assimilated into the American society, although there may have been others who hid and were never known about, living out their days in the wilds of nature alone. The Yahi were indigenous *Homo sapiens* that, like so many other indigenous throughout the world, had a connection with nature and the utmost respect for it, along with a strong moral character. Theodora Kroeber described them as,

“Indians who knew their land, its bounteousness, its varied beauty, its fragility. Who used it well, benefiting man, leaving unraped, its animals, plants, trees, Earth, streams, beaches, ocean. Whose way was, one of reason, contentment, Self-knowledge.”

“The California Indian was, in other words, a true provincial. He was an introvert, reserved, contemplative, and philosophical. He lived at ease with the supernatural and the mystical which were pervasive in all aspects of life. He felt no need to differentiate mystical truth from directly evidential or “material” truth, or the supernatural from the natural: one was as manifest as the other within his system of values and perceptions and beliefs. The promoter, the boaster, the aggressor, the egoist, the innovator, would have been looked at askance. The ideal was the man of restraint, dignity, rectitude, he of the Middle Way.” (91)

In August 1911, Ishi with his hair burned short as a sign of mourning, walked out of the wild and into Oroville, California where he was promptly locked up in the jail for the insane. Anthropologists from the University of California heard of the incident, and they took Ishi back to the University where he lived for the remaining four years and seven months of his life, eventually dying of tuberculosis. Hence, in the end he finally succumbed like so many other indigenous before him, dying as a result of a disease brought by the invaders. During his sojourn at the museum he was studied and demonstrated his skills of arrowhead making, bow stringing, and fire starting on Sunday afternoons for public audiences, and was basically used as a living museum piece while also working as a janitorial assistant at the museum to earn a very modest income. (93)

A better fate perhaps than some of his fellow tribe members who were ambushed and murdered in cold blood while they lay asleep, or others which were rounded up to be put on a government reservation and died during the process, or even the fate of the millions of other indigenous *Homo sapiens* who were raped and/or murdered by the ruthless and barbaric conquerors. Theodora Kroeber described detailed several such incidents when she wrote,

“It was the early 'sixties that the whole white population of the Sacramento Valley was in an uproar of rage and fear over the murder for five white children by hill Indians-probably Yahi. But the soberly estimated numbers of kidnappings of Indian children by whites in California to be sold as slaves or kept as cheap help was, between the years 1852 and 1867, from three to four *thousand*; every Indian woman, girl, and girl-child was potentially and in thousands of cases actually subject to repeated rape, to kidnapping, and to prostitution. Prostitution was unknown to aboriginal California, as were the venereal diseases which accounted for from forty to as high as eighty percent of Indian deaths during the first twenty years following the gold rush.”

“In the company of these first comers were the inevitable trigger-happy few whose habit had become to shoot an Indian, any Indian, on sight; who counted *coup* under the slogan, The only good Indian is a dead Indian,” and who were possessed of a the special skill of scalping, something previously unknown to California's aborigines. There was one such of whom

Waterman writes: "On good authority I can report the case of an old prospector-pioneer-miner-trapper of this region [Butte County], who had on his bed even in recent years a blanket lined with Indian scalps. These had been taken years before. He had never been a government scout, soldier, or officer of the law. The Indians he had killed purely on his own account. No reckoning was at any time demanded of him."

"Forced migrations account for some hundred of Yana deaths; but death by shooting and particularly by mass-murder shooting interspersed with hangings were the usual and popular techniques of extermination."

"A Captain Starr escorted the Indians on their march. He left Chico with four hundred and sixty-one Indians, and arrived at Round Valley with two hundred and seventy-seven. Two were unaccounted for; thirty-two died on the march; and a hundred and fifty were left sick along the trail to be brought in later if they should recover enough to continue the trip. Those Indians who did recover returned home, some reaching Chico ahead of the troops. Of those who were taken all the way to Round Valley little is known. The *War Records* quote one general as saying that it was impossible to keep Indians on a reservation."

"There was one young Yana woman, unusually popular with the white people who knew and employed her, who was dragged by force out of the white man's home where she lived. Her old aunt and uncle who were there with her were also taken, and the three of them pumped full of bullets on the spot. Curtin's informant had counted eleven bullet holes in the breast of the young woman. The man who killed her, and who was well "likkered up," was not satisfied. "I don't think that squaw is dead yet," he is reported as saying. To make sure, he smashed in her skull with his revolver."

"Waiting only until there was light enough for his men to see where they were shooting, Anderson directed a continuous stream of gunfire down from above onto the sleeping village. As he had surmised, the ahi ran downstream making for the open ford which brought them under Good's fire from below. The terrified Indians leapt into Mill Creek, but the rapid current was a sorry protection. They became targets there for Good's fun, and Mill Creek ran red with the blood of its people. Anderson reported that "many dead bodies floated down the rapid current...A few Yahi escaped, the small child Ishi and his mother among them." (97)

Smallpox was intentionally spread among the indigenous *Homo sapiens* of the Americas in 1763 via blankets given as a gift causing a pandemic among the Ohio Valley and Great Lakes tribes and ultimately led to 500,000 to 1,500,000 deaths. No one will ever know the exact number of indigenous *Homo sapiens* around the world that died, either slaughtered by the direct hand of the conquerors, by the diseases brought with them, or as a result of the forced assimilation which followed. Like all genocides throughout history no one will ever know the exact total, was it 25,000,000 or 50,000,000 or 100,000,000 or perhaps even more? When attempting to gather statistics on the number of Yana killed, Theodora Kroeber describes the difficulty with trying to establish exact numbers in saying,

"...for the nature of the available source material can but rarely yield exact figures. Since all the information is from white sources, and since an account of an Indian murder of a white was more acceptable copy than the reverse event, any inaccuracy in ration will minimize the extent of the disproportion...the accounts say "several," "many," "a few"- not exact numbers which yield exact totals, not to mention those deaths of which no formal record survives." (655)

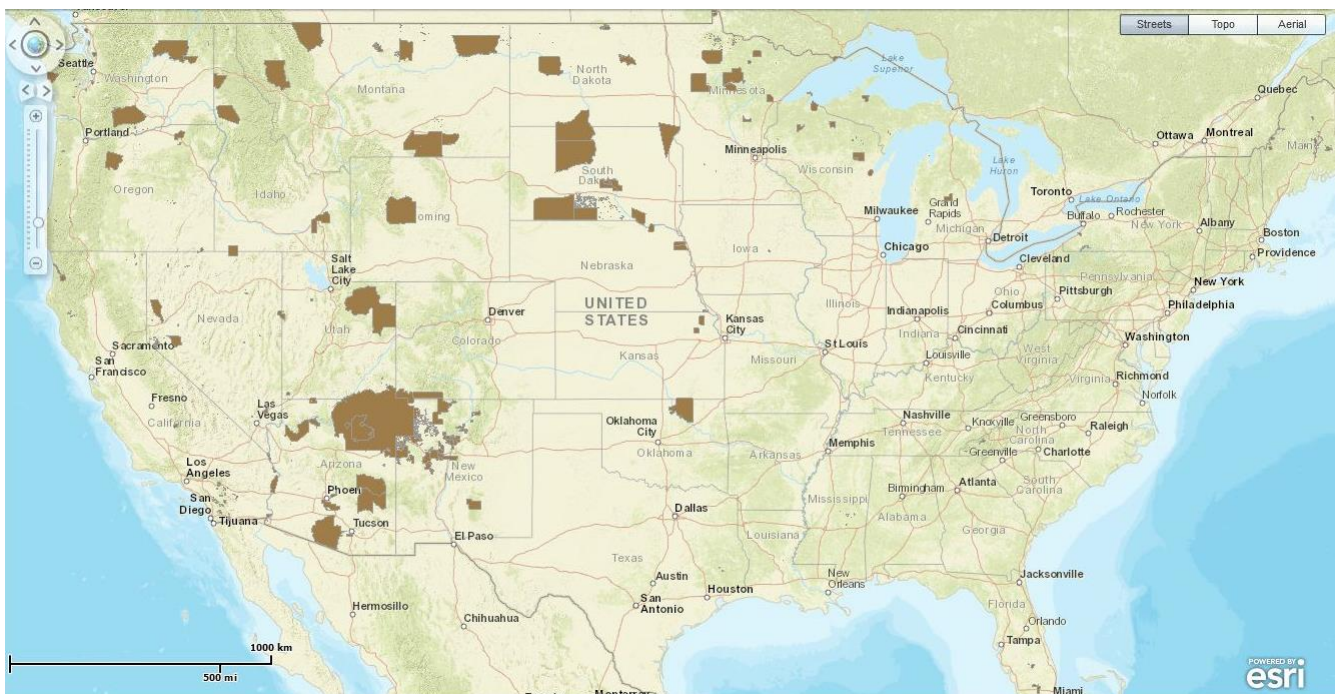
Even recent attempts by governments to assimilate indigenous *Homo sapiens* has been brutal, like the 'Sixties Scoop' between the 1960s and the late 1980s in which the Canadian government took an estimated 20,000 Aboriginal children from their families and placed them in foster homes. Or the similar action taken by Australian Federal and State government agencies and church missions between 1905 and 1969 towards the children of Australian Aboriginal and Torres Strait Islander descendants who were removed from their families, and later known as the 'Stolen Generation'. This forced assimilation of another race and subsequent elimination of an entire culture stems from nothing more than ideology and has been used to justify all forms of tyranny in the past and even the present. Aleksandr Solzhenitsyn wrote,

"Ideology—that is what gives evil-doing its long-sought justification and gives the evil-doer the necessary steadfastness and determination. That is the social theory which helps to make his acts seem good instead of bad in his own and others' eyes, so that he won't hear reproaches and curses but will receive praise and honors. That was how the agents of the Inquisition fortified their wills: by invoking Christianity; the conquerors of foreign lands, by extolling the grandeur of their Motherland; the colonizers, by civilization; the Nazis, by race; and the Jacobins (early and late), by equality, brotherhood, and the happiness of future generations.

Thanks to ideology, the twentieth century was fated to experience evil-doing on a scale calculated in the millions. This cannot be denied, nor passed over, nor suppressed. How, then, do we dare insist that evil-doers do not exist? And who was it that destroyed these millions? Without evil-doers there would have been no Archipelago." (684)

Many Americans have no real conception of the genocide which took place, they are blinded to reality by 'Cowboys and Indians' entertainment presented in western books, TV, and movies resulting in a Gunsmoke, Lone Ranger, John Wayne type mentality viewing the indigenous as savages out to kill women and children. Others give only slight recognition to the historical facts being dismissive and brushing it off as a mistake that cannot be undone, or they erroneously believe that it has been corrected. Some think that now all indigenous *Homo sapiens* in the United States live a great life on a reservation somewhere, that they are free and independent of the United States government, that they have great wealth from casinos and mineral rights, when in reality it is the exact opposite. Since 1831 in the United States, the U.S. government has acted as the trustee of indigenous *Homo sapiens* affairs, with their lands being owned and managed by the U.S. government and nearly every aspect of economic development being controlled by federal agencies. Most Americans have shunned the indigenous *Homo sapiens* in the United States and have no idea of the poverty-stricken state some of them live in, or that they have extremely higher rates of alcoholism and suicide. Most Americans are unaware of how the U. S. government still exploits them even today, and even fewer know about how the U.S. government has bilked them out of \$48,000,000,000 since 1887, but only compensated them \$3,400,000,000 in a 1996 lawsuit. (654). Only 4 standing U.S. presidents have visited indigenous reservations over the last 90 years. Calvin Coolidge traveled to South Dakota's Pine Ridge reservation in 1927, three years after he signed the Indian Citizenship Act that granted some indigenous American citizenship. Franklin Roosevelt visited North Carolina's Cherokee Nation in 1936, then in 1999, Bill Clinton also visited Pine Ridge reservation, and in June 2014 Barack Obama visited Standing Rock reservation. Why do so few U.S. Presidents visit indigenous reservations?

Even today there are prominent symbols of racism based on the past and the misconception about all indigenous *Homo sapiens* being great warriors and wanting to fight. In 1937, the Boston Braves moved to Washington D.C. and were renamed the Washington Redskins, and this racist name is still used today contrary to major opposition. How can such a racist name symbolize the football team which is representing the nation's capital? As of 2017, there were 2,129 mascots for high school, college, and pro teams that reference Braves, Chiefs, Indians, Orangemen, Raiders, Redmen, Reds, Redskins, Savages, Squaws, Tribe and Warriors, Apaches, Arapahoe, Aztecs, Cherokees, Chickasaws, Chinooks, Chippewas, Choctaws, Comanches, Eskimos, Mohawks, Mohicans, Seminoles, Sioux, and Utes. (317)



SOURCE: National Library of Medicine / TOXMAP – Brown shaded areas are Native Lands - Although the entire continent of North America was once land inhabited by and belonging to indigenous *Homo sapiens*, currently very little remains in the United States. - <https://toxmap.nlm.nih.gov/toxmap/>

In the United States, indigenous *Homo sapiens* also still struggle with many social and economic issues. Diabetes, cancer, heart disease, poor dental health, infectious disease, alcohol and substance abuse, domestic and community violence, and mental illness are all prominent afflictions within the indigenous *Homo sapiens* population of the United States. Even in today's modern and thriving American society some indigenous *Homo sapiens* do not have access to adequate housing, sanitation, health care, food, education, and other necessities which are available to most all other United States citizens. How can indigenous *Homo sapiens* in the United States be lacking so many basic necessities in a nation which has such abundant resources? The U.S. Commission on Civil Rights 2003 report, '*A Quiet Crisis Federal Funding and Unmet Needs in Indian Country*', concluded,

"The federal government's failure to avail Native Americans of services and programs available to other Americans violates their civil rights. This report demonstrates that funding for services critical to Native Americans—including health care, law enforcement, and education—is disproportionately lower than funding for services to other populations. For example, the federal government's rate of spending on health care for Native Americans is 50 percent less than for prisoners or Medicaid recipients, and 60 percent less than is spent annually on health care for the average American. Underfunding violates the basic tenets of the trust relationship between the government and Native peoples and perpetuates a civil rights crisis in Indian Country.

For more than 40 years, the U.S. Commission on Civil Rights has documented the dismal conditions in Native communities. Sadly, conditions in Indian Country are current-day reflections of some of the Commission's earliest works, despite continued funding and promises to improve. To what degree the federal government has failed to live up to its obligations and the implications of that failure are questions to which the Commission now addresses itself. In every area reviewed—health, housing, law enforcement, education, food distribution—funding and services are inadequate, as they have been historically. Some observers have labeled the economic condition in Indian Country "termination by funding cuts,"²⁸ as funding has so severely limited the ability of tribal governments to provide the services needed to sustain life on reservations."

"According to members of the Senate Indian Affairs Committee, roughly 90,000 Indian families are homeless or under-housed; more than 30 percent of reservation households are crowded; 18 percent are severely crowded; and one in five Indian houses lacks complete plumbing facilities. Roughly percent of Native American homes are without telephones, while only 6 percent of non-Native households lack telephone service. Some Native American communities lack even the infrastructure for telephone installation, hampering basic communication. Overall, approximately 40 percent of on-reservation housing is considered inadequate as compared with roughly 6 percent nationwide. For Native Hawaiians, the situation is even more dire: 36 percent of homes are overcrowded, and 49 percent of Native Hawaiians experience housing problems. Regional variations exist and are associated with geographic isolation, proximity to urban economies, and private ownership of land. For example, in Alaska, Arizona, and New Mexico, the rate of overcrowding and substandard housing is more than 60 percent.

Basic housing provisions that are taken for granted elsewhere in the nation are often absent on reservations. For example, fewer than 50 percent of homes on reservations are connected to a public sewer system. Twenty percent of homes must resort to other means of sewage disposal, often resulting in "honeybucket" methods in which household waste and sewage are collected into large receptacles that are later dumped into lagoons beyond the boundaries of the village or tribe. Settlements that use this system often suffer serious contamination and severe bacterial and viral infection from the waste and sewage washing back into the communities after heavy rainfall; this system also results in the poisoning of crops."

"Another significant role of IHS is the construction and maintenance of sanitation facilities, including water supplies, sewage disposal, and solid waste sites, in individual homes and communities. Adequate sanitation facilities play a large role in disease prevention. Currently, however, approximately 21,500 Native American homes (nearly 8 percent) lack safe water. In comparison, the same is true for 1 percent of all U.S. homes."

"In addition to being the victims of crime more often, Native Americans are also overrepresented in jails and prisons. American Indians are incarcerated at a rate 38 percent higher than the national per capita rate. Alaska Natives are incarcerated at nearly twice the rate of their representation in the state population. The number of Native American youth in the federal prison system has increased 50 percent since 1994. Many Native Americans attribute disproportionate incarceration rates to unfair treatment by the criminal justice system, including racial profiling, disparities in prosecution, and lack of access to legal representation. Because of burgeoning crime and lack of prevention programs, jails in Indian Country regularly operate beyond capacity. In 2001, the 10 largest jails were at 142 percent capacity, and nearly a third of all tribal facilities were operating above 150 percent capacity. According to a DOJ study, in some Native jails resources are so scarce that inmates do not have blankets, mattresses, or basic hygiene items, such as soap and toothpaste."

"Unemployment and poverty have continuously plagued the vast majority of Native American communities. On some reservations, unemployment levels have reached 85 percent. According to the 2000 census, average unemployment on reservations is 13.6 percent, more than twice the national rate. Likewise, 31.2 percent of reservation inhabitants live in poverty, and the national poverty rate for Native Americans is 24.5 percent.¹³ By contrast, the national poverty rate in the

United States between 1999 and 2001 was 11.6 percent. Having reached crisis proportions, disparities in impoverishment and unemployment offer further evidence of the federal government's failure to protect the rights of and promote equal opportunities for Native Americans."

"Native Americans suffer food insecurity and hunger at twice the rate of the general population. USDA found that from 1995 to 1997, 22.2 percent of Native American households were food insecure, meaning they did not have enough food to meet even their basic needs. In fact, the situation was so severe that USDA determined that from 1995 to 1997, one or more members of these households suffered from moderate to severe hunger, with 8.6 percent of households experiencing both food insecurity and hunger." (585)

For the last 500 years indigenous *Homo sapiens* throughout the world have been victims of modern society's forced assimilation, which is nothing more than a continuous disintegration and extinction of cultures still ongoing in some parts of the world. To see the continuous struggle for land, justice, and equality which so many indigenous *Homo sapiens* face one need only watch Nettie Wild's 1998 documentary '*A Place Called Chiapas*'. Poverty, alcoholism, rape, malnutrition, suicide, disease, violence and brutality, imprisonment, and other issues affect many of the more than 370,000,000 indigenous *Homo sapiens* throughout the world. In 2010, the first ever United Nations publication on the state of the world's indigenous *Homo sapiens* was released, it stated,

"In the United States, a Native American is 600 times more likely to contract tuberculosis and 62 per cent more likely to commit suicide than the general population."

"While indigenous peoples make up around 370 million of the world's population – some 5 per cent – they constitute around one-third of the world's 900 million extremely poor rural people. Every day, indigenous communities allover the world face issues of violence and brutality, continuing assimilation policies, dispossession of land, marginalization, forced removal or relocation, denial of land rights, impacts of large-scale development, abuses by military forces and a host of other abuses.:

"Indigenous peoples experience disproportionately high levels of maternal and infant mortality, malnutrition, cardiovascular illnesses, HIV/AIDS and other infectious diseases such as malaria and tuberculosis."

"Suicide rates of indigenous peoples, particularly among youth, are considerably higher in many countries, for example, up to 11 times the national average for the Inuit in Canada."

"Indigenous peoples account for most of the world's cultural diversity. Throughout the world, there are approximately 370 million indigenous peoples occupying 20 per cent of the earth's territory. It is also estimated that they represent as many as 5,000 different indigenous cultures. The indigenous peoples of the world therefore account for most of the world's cultural diversity, even though they constitute a numerical minority."

"Violence, forced assimilation, abuse. Despite all the positive developments in international human rights standard-setting, indigenous peoples continue to face serious human rights abuses on a day-to-day basis. Issues of violence and brutality, continuing assimilation policies, marginalization, dispossession of land, forced removal or relocation, denial of land rights, impacts of large-scale development, abuses by military forces and armed conflict, and a host of other abuses, are a reality for indigenous communities around the world. Examples of violence and brutality have been heard from every corner of the world, most often perpetrated against indigenous persons who are defending their rights and their lands, territories and communities.

Violence against women. An indigenous woman is more likely to be raped, with some estimates showing that more than one in three indigenous women are raped during their lifetime.

Systemic racism. Indigenous peoples frequently raise concerns about systemic discrimination and outright racism from the State and its authorities. This discrimination manifests itself in a number of ways such as frequent and unnecessary questioning by the police, condescending attitudes of teachers to students or rudeness from a receptionist in a government office. At their most extreme, these forms of discrimination lead to gross violations of human rights, such as murder, rape and other forms of violence or intimidation. These forms of discrimination are often either difficult to quantify and verify or are simply not documented by the authorities, or not disaggregated based on ethnicity."

"Despite some progress, little change. Despite efforts over the last 40 years to improve conditions and to increase recognition of indigenous rights through law and policy, litigation, national dialogue and enhanced leadership opportunities, full accommodation of indigenous rights remains elusive."

"There are around 300,000 Forest Peoples – also referred to as "Pygmies" or "Batwa" - in the Central African rainforest. These peoples are now facing unprecedented pressures on their lands, forest resources and societies, as forests are logged, cleared for agriculture or turned into exclusive wildlife conservation areas. They are becoming outcasts on the edge of dominant society as they settle in villages and are increasingly dependent on the cash economy, but are unable to enjoy the

rights accorded to other citizens and are marginalized from decision-making. As these pressures intensify, Pygmy peoples are suffering increasing poverty, racial discrimination, violence and cultural collapse. Throughout Central Africa, their traditional way of life is disappearing, and their incomparable knowledge of the forest is being lost."

"The Maori comprise less than 15 per cent of the New Zealand population, yet account for 40 per cent of all court convictions and half the prison population."

"Ninety per cent of the timber being extracted in the Peruvian Amazon is illegal and originates from protected areas belonging to indigenous communities or set aside for indigenous peoples who live involuntary isolation."

"Almost a quarter of Native Americans and Alaska Natives live under the poverty line in the United States, compared to about 12.5 per cent of the total population."

"Native Americans and Alaska Natives have higher death rates than other Americans from tuberculosis (600per cent higher), alcoholism (510 per cent higher), motor vehicle crashes (229 per cent higher), diabetes (189per cent higher), unintentional injuries (152 per cent higher), homicide (61 per cent higher) and suicide (62 percent higher)."

"While indigenous peoples in Canada represent only 3 per cent of the total population, they make up around19 per cent of federal prisoners." (494)

Migrants, Refugees and Asylum Seekers

The United Nations Refugee Agency reported that in 1997 there were 33,900,000 forcibly displaced *Homo sapiens* worldwide, by 2016 this number increased to 65,600,000. (672) Migrants, refugees, and asylum seekers are forcibly displaced as a result of violence, persecution, war, natural disaster, and global warming. During their migration or when reaching their destination country, they are too often subjected to xenophobia and racism resulting in discrimination, and some becoming victims of violent and even deadly attacks from oppositionist anxiously awaiting their arrival in the host country.

Contemporary Slavery

Slavery has been abolished de jure in all countries, but de facto slavery in the form of involuntary servitude, serfdom, domestic servants held in captivity, debt bondage, sexual slavery, child soldiers, and forced marriage still take place worldwide. The 2016 Global Slavery Index estimated that 45,800,000 *Homo sapiens* worldwide are victims of some form of contemporary slavery, with 58% of them residing in either India, China, Pakistan, Bangladesh, and Uzbekistan. 18,354,700 slaves reside in India alone, making it by far the nation with the most contemporary slaves. (266) Additionally, there are also millions of adult laborers working in sweatshops in some impoverished countries which lack labor laws or safety standards. These workers are exploited and made to work long hours under horrendous conditions for extremely low wages, usually earning less than \$1.00 an hour making items which often are sold for an absurd price.

Most individuals around the world are not even aware of the trafficking and exploitation of millions of *Homo sapiens* worldwide which occurs, and many politicians and governments turn a blind eye to the practice. How can such advanced and civilized nations like: the United States, Germany, the Netherlands, Belgium, Switzerland, Bulgaria, Greece, Turkey, Brazil, Italy, Ireland, Spain, United Kingdom, Brazil, China, and others allow this sort of social injustice to even occur within their own borders?

Current World Slave Trade, Trafficking of <i>Homo sapiens</i> , and other Exploitation of <i>Homo sapiens</i>	
COUNTRY/REGION	DESCRIPTION
Afhaanistan	Afghanistan is a source transit, and destination country for men, women, and children subjected to forced labor and sex trafficking, although domestic trafficking is more prevalent than transnational trafficking; Afghan men are subjected to forced labor and debt bondage in Iran, Pakistan, Greece, Turkey, and the Gulf states; Afghan women and girls are forced into prostitution and domestic servitude in Pakistan, Iran, and India, while women and girls from the Philippines, Pakistan, Iran Tajikistan, and China are reportedly sexually exploited in Afghanistan; children are increasingly subjected to forced labor in carpet-making factories, domestic servitude, forced begging, and commercial sexual exploitation; some children are sold to settle debts.

Albania	Albania is a source country for men, women, and children subjected to sex trafficking and forced labor; Albanian victims of sexual exploitation are trafficked within Albania and in Greece, Italy, Macedonia, Kosovo, Belgium, the Netherlands, Germany, Switzerland, Ireland, and the UK; some Albanian women become sex trafficking victims after accepting offers of legitimate jobs; Albanian children are forced to beg or perform other forms of forced labor; Filipino victims of labor trafficking were identified in Albania during 2012.
Algeria	Algeria is a transit and, to a lesser extent, a destination and source country for women subjected to forced labor and sex trafficking and, to a lesser extent, men subjected to forced labor; criminal networks, sometimes extending to sub-Saharan Africa and to Europe, are involved in human smuggling and trafficking in Algeria; sub-Saharan adults enter Algeria voluntarily but illegally, often with the aid of smugglers, for onward travel to Europe, but some of the women are forced into prostitution, domestic service, and begging; some sub-Saharan men, mostly from Mali, are forced into domestic servitude; some Algerian women and children are also forced into prostitution domestically.
Angola	Angola is a source and destination country for men, women, and children subjected to sex trafficking and forced labor in agriculture, construction, domestic service, and diamond mines; some Angolan girls are forced into domestic prostitution into domestic prostitution, while some Angolan boys are taken to Namibia as forced laborers or are forced to be cross-border couriers; women and children are also forced into domestic service in South Africa, the Democratic Republic of the Congo, Namibia, and European countries; Vietnamese, Brazilian, and Chinese women are trafficked to Angola for prostitution, while Chinese, Southeast Asian, Namibian, and possibly Congolese migrants are subjected to forced labor in Angola's construction industry.
Antigua and Barbuda	Current situation: Antigua and Barbuda is a destination and transit country for adults and children subjected to sex trafficking and forced labor; forced prostitution has been reported in bars, taverns, and brothels, while forced labor occurs in domestic service and the retail sector.
Bahrain	Bahrain is a destination country for men and women subjected to forced labor and sex trafficking; unskilled and domestic workers from India, Pakistan, Nepal, Sri Lanka, Bangladesh, Indonesia, Thailand, the Philippines, Ethiopia, Ghana, and Eritrea migrate willingly to Bahrain, but some face conditions of forced labor through the withholding of passports, restrictions on movement, nonpayment, threats, and abuse; many Bahraini labor recruitment agencies and some employers charge foreign workers exorbitant fees that make them vulnerable to forced labor and sexual exploitation because they are not protected under labor laws; women from Thailand, the Philippines, Morocco, Jordan, Syria, Lebanon, China, Vietnam, Russia, Ukraine, and Eastern European countries are forced into prostitution in Bahrain.
Belarus	Belarus is a source, transit, and destination country for women, men, and children subjected to sex trafficking and forced labor; more victims are exploited within Belarus than abroad; Belarusians exploited abroad are primarily trafficked to Germany, Poland, Russian, and Turkey but also other European countries, the Middle East, Japan, Kazakhstan, and Mexico; Moldovans, Russians, Ukrainians, and Vietnamese are exploited in Belarus; state-sponsored forced labor is a continuing problem; students are forced to do farm labor without pay and military conscripts are forced to perform unpaid non-military work; the government has retained a decree forbidding workers in state-owned wood processing factories from leaving their jobs without their employers' permission.
Belize	Belize is a source, destination, and transit country for men, women, and children subjected to forced labor and sex trafficking; the coerced prostitution of women and children by family members has not led to arrests; child sex tourism, involving primarily US citizens, is on the rise; sex trafficking and forced labor of Belizean and foreign women and LGBT individuals occurs in bars, nightclubs, brothels, and domestic service; workers from Central America, Mexico, and Asia may fall victim to forced labor in restaurants, shops, agriculture, and fishing.
Bolivia	Bolivia is a source country for men, women, and children subjected to forced labor and sex trafficking domestically and abroad; indigenous children are particularly vulnerable; Bolivia is a source country for men, women, and children subjected to forced labor and sex trafficking domestically and abroad; rural and poor Bolivians, most of whom are indigenous, and LGBT youth are particularly vulnerable; Bolivians perform forced labor domestically in mining, ranching, agriculture, and domestic service, and a significant number are in forced labor abroad in sweatshops, agriculture, domestic service, and the informal sector; women and girls are sex trafficked within Bolivia and in neighboring countries, such as Argentina, Peru, and Chile; a limited number of women from nearby countries are sex trafficked in Bolivia.
Botswana	Botswana is a source, transit, and destination country for women and children subjected to sex trafficking and forced labor; young Botswana serving as domestic workers, sometimes sent by their parents, may be denied education and basic necessities or experience confinement and abuse indicative of forced labor; Botswana girls and women also are forced into prostitution domestically; adults and

	children of San ethnicity were reported to be in forced labor on farms and at cattle posts in the country's rural west.
Bulgaria	Bulgaria is a source and, to a lesser extent, a transit and destination country for men, women, and children subjected to sex trafficking and forced labor; Bulgaria is one of the main sources of human trafficking in the EU; women and children are increasingly sex trafficked domestically, as well as in Europe, Russia, the Middle East, and the US; adults and children become forced laborers in agriculture, construction, and the service sector in Europe, Israel, and Zambia; Romanian girls are also subjected to sex trafficking in Bulgaria.
Burkina Faso	Burkina Faso is a source, transit, and destination country for women and children subjected to forced labor and sex trafficking; Burkinabe children are forced to work as farm hands, gold panners and washers, street vendors, domestic servants, and beggars or in the commercial sex trade, with some transported to nearby countries; to a lesser extent, Burkinabe women are recruited for legitimate jobs in the Middle East or Europe and subsequently forced into prostitution; women from other West African countries are also lured to Burkina Faso for work and subjected to forced prostitution, forced labor in restaurants, or domestic servitude.
Burma	Burma is a source country for men, women, and children trafficked for the purpose of forced labor and for women and children subjected to sex trafficking; Burmese adult and child labor migrants travel to East Asia, the Middle East, South Asia, and the US, where men are forced to work in the fishing, manufacturing, forestry, and construction industries and women and girls are forced into prostitution, domestic servitude, or forced labor in the garment sector; some Burmese economic migrants and Rohingya asylum seekers have become forced laborers on Thai fishing boats; some military personnel and armed ethnic groups unlawfully conscript child soldiers or coerce adults and children into forced labor; domestically, adults and children from ethnic areas are vulnerable to forced labor on plantations and in mines, while children may also be subject to forced prostitution, domestic service, and begging.
Burundi	Burundi is a source country for children and possibly women subjected to forced labor and sex trafficking; business people recruit Burundian girls for prostitution domestically, as well as in Rwanda, Kenya, Uganda, and the Middle East, and recruit boys and girls for forced labor in Burundi and Tanzania; children and young adults are coerced into forced labor in farming, mining, informal commerce, fishing, or collecting river stones for construction; sometimes family, friends, and neighbors are complicit in exploiting children, at times luring them in with offers of educational or job opportunities.
Cambodia	Cambodia is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; Cambodian men, women, and children migrate to countries within the region and, increasingly, the Middle East for legitimate work but are subjected to sex trafficking, domestic servitude, or forced labor in fishing, agriculture, construction, and factories; Cambodian men recruited to work on Thai-owned fishing vessels are subsequently subjected to forced labor in international waters and are kept at sea for years; poor Cambodian children are vulnerable and, often with the families' complicity, are subject to forced labor, including domestic servitude and forced begging, in Thailand and Vietnam; Cambodian and ethnic Vietnamese women and girls are trafficked from rural areas to urban centers and tourist spots for sexual exploitation; Cambodian men are the main exploiters of child prostitutes, but men from other Asian countries, and the West travel to Cambodia for child sex tourism.
Central African Republic	Central African Republic (CAR) is a source, transit, and destination country for children subjected to forced labor and sex trafficking, women subjected to forced prostitution, and adults subjected to forced labor; most victims appear to be CAR citizens exploited within the country, with a smaller number transported back and forth between the CAR and nearby countries; armed groups operating in the CAR, including those aligned with the former SELEKA Government and the Lord's Resistance Army, continue to recruit and re-recruit children for military activities and labor; children are also subject to domestic servitude, commercial sexual exploitation, and forced labor in agriculture, mines, shops, and street vending; women and girls are subject to domestic servitude, sexual slavery, commercial sexual exploitation, and forced marriage.
China	China is a source, transit, and destination country for men, women, and children subjected to sex trafficking and forced labor; Chinese adults and children are forced into prostitution and various forms of forced labor, including begging and working in brick kilns, coal mines, and factories; women and children are recruited from rural areas and taken to urban centers for sexual exploitation, often lured by criminal syndicates or gangs with fraudulent job offers; state-sponsored forced labor, where detainees work for up to four years often with no remuneration, continues to be a serious concern; Chinese men, women, and children also may be subjected to conditions of sex trafficking and forced labor worldwide, particularly in overseas Chinese communities; women and children are trafficked to China from neighboring countries, as well as Africa and the Americas, for forced labor and

	prostitution.
Comoros	Comoros is a source country for children subjected to forced labor and, reportedly, sex trafficking domestically, and women and children are subjected to forced labor in Mayotte; it is possibly a transit and destination country for Malagasy women and girls and a transit country for East African women and girls exploited in domestic service in the Middle East; Comoran children are forced to labor in domestic service, roadside and street vending, baking, fishing, and agriculture; some Comoran students at Koranic schools are exploited for forced agricultural or domestic labor, sometimes being subjected to physical and sexual abuse; Comoros may be particularly vulnerable to transnational trafficking because of inadequate border controls, government corruption, and the presence of international criminal networks.
The Democratic Republic of the Congo	The Democratic Republic of the Congo is a source, destination, and possibly a transit country for men, women, and children subjected to forced labor and sex trafficking; the majority of this trafficking is internal, and much of it is perpetrated by armed groups and rogue government forces outside official control in the country's unstable eastern provinces; Congolese adults are subjected to forced labor, including debt bondage, in unlicensed mines, and women may be forced into prostitution; Congolese women and girls are subjected to forced marriages where they are vulnerable to domestic servitude or sex trafficking, while children are forced to work in agriculture, mining, mineral smuggling, vending, portering, and begging; Congolese women and children migrate to countries in Africa, the Middle East, and Europe where some are subjected to forced prostitution, domestic servitude, and forced labor in agriculture and diamond mining; indigenous and foreign armed groups, including the Lord's Resistance Army, abduct and forcibly recruit Congolese adults and children to serve as laborers, porters, domestics, combatants, and sex slaves; some elements of the Congolese national army (FARDC) also forced adults to carry supplies, equipment, and looted goods, but no cases of the FARDC recruiting child soldiers were reported in 2014 – a significant change.
The Republic of the Congo	The Republic of the Congo is a source and destination country for children, men, and women, subjected to forced labor and sex trafficking; most trafficking victims are from Benin, the Democratic Republic of the Congo (DRC), and, to a lesser extent, other neighboring countries and are subjected to domestic servitude and market vending by West African and Congolese nationals; adults and children, the majority from the DRC, are also sex trafficked in Congo, mainly Brazzaville; internal trafficking victims, often from rural areas, are exploited as domestic servants or forced to work in quarries, bakeries, fishing, and agriculture.
Costa Rica	Costa Rica is a source, transit, and destination country for men, women, and children subjected to sex trafficking and forced labor; Costa Rican women and children, as well as those from Nicaragua, the Dominican Republic, and other Latin American countries, are sex trafficked in Costa Rica; child sex tourism is a particular problem with offenders coming from the US and Europe; men and children from Central America, including indigenous Panamanians, and Asia are exploited in agriculture, construction, fishing, and commerce; Nicaraguans transit Costa Rica to reach Panama, where some are subjected to forced labor or sex trafficking.
Cuba	Cuba is a source country for adults and children subjected to sex trafficking and forced labor; child sex trafficking and child sex tourism occur in Cuba, while some Cubans are forced into prostitution in South America and the Caribbean; allegations have been made that some Cubans have been forced or coerced to work at Cuban medical missions abroad; assessing the scope of trafficking within Cuba is difficult because of the lack of information.
Djibouti	Djibouti is a transit, source, and destination country for men, women, and children subjected to forced labor and sex trafficking; economic migrants from East Africa en route to Yemen and other Middle East locations are vulnerable to exploitation in Djibouti; some women and girls may be forced into domestic servitude or prostitution after reaching Djibouti City, the Ethiopia-Djibouti trucking corridor, or Obock – the main crossing point into Yemen; Djiboutian and foreign children may be forced to beg, to work as domestic servants, or to commit theft and other petty crimes.
Egypt	Egypt is a source, transit, and destination country for men, women, and children subjected to sex trafficking and forced labor; Egyptian children, including the large population of street children are vulnerable to forced labor in domestic service, begging and agriculture or may be victims of sex trafficking or child sex tourism, which occurs in Cairo, Alexandria, and Luxor; some Egyptian women and girls are sold into “temporary” or “summer” marriages with Gulf men, through the complicity of their parents or marriage brokers, and are exploited for prostitution or forced labor; Egyptian men are subject to forced labor in neighboring countries, while adults from South and Southeast Asia and East Africa – and increasingly Syrian refugees – are forced to work in domestic service, construction, cleaning, and begging in Egypt; women and girls, including migrants and refugees, from Asia, sub-Saharan Africa, and the Middle East are sex trafficked in Egypt; the Egyptian military cracked down on criminal group's smuggling, abducting, trafficking, and extorting African migrants in the Sinai

	Peninsula, but the practice has reemerged along Egypt's western border with Libya.
Equatorial Guinea	Equatorial Guinea is a source country for children subjected to sex trafficking and destination country for men, women, and children subjected to forced labor; Equatorial Guinean girls may be encouraged by their parents to engage in the sex trade in urban centers to receive groceries, gifts, housing, and money; children are also trafficked from nearby countries for work as domestic servants, market laborers, ambulant vendors, and launderers; women are trafficked to Equatorial Guinea from Cameroon, Benin, other neighboring countries, and China for forced labor or prostitution.
Eritrea	Eritrea is a source country for men, women, and children trafficked for the purposes of forced labor domestically and, to a lesser extent, sex and labor trafficking abroad; the country's national service program is often abused, with conscripts detained indefinitely and subjected to forced labor; Eritrean migrants, often fleeing national service, face strict exit control procedures and limited access to passports and visas, making them vulnerable to trafficking; Eritrean secondary school children are required to take part in public works projects during their summer breaks and must attend military and educational camp in their final year to obtain a high school graduation certificate and to gain access to higher education and some jobs; some Eritreans living in or near refugee camps, particularly in Sudan, are kidnapped by criminal groups and held for ransom in the Sinai Peninsula and Libya, where they are subjected to forced labor and abuse.
Gabon	Gabon is primarily a destination and transit country for adults and children from West and Central African countries subjected to forced labor and sex trafficking; boys are forced to work as street vendors, mechanics, or in the fishing sector, while girls are subjected to domestic servitude or forced to work in markets or roadside restaurants; West African women are forced into domestic servitude or prostitution; men are reportedly forced to work on cattle farms; some foreign adults end up in forced labor in Gabon after initially seeking the help of human smugglers to help them migrate clandestinely; traffickers operate in loose, ethnic-based criminal networks, with female traffickers recruiting and facilitating the transport of victims from source countries; in some cases, families turn child victims over to traffickers, who promise paid jobs in Gabon.
The Gambia	The Gambia is a source and destination country for women and children subjected to forced labor and sex trafficking; Gambian women, girls, and, to a lesser extent, boys are exploited for prostitution and domestic servitude; women, girls, and boys from West African countries are trafficked to The Gambia for commercial sexual exploitation, particularly by European sex tourists; boys in some Koranic schools are forced into street vending or begging; some Gambian children have been identified as victims of forced labor in neighboring West African countries.
Ghana	Ghana is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; the trafficking of Ghanians, particularly children, internally is more common than the trafficking of foreign nationals; Ghanaian children are subjected to forced labor in fishing, domestic service, street hawking, begging, portering, mining, quarrying, herding, and agriculture, with girls, and to a lesser extent boys, forced into prostitution; Ghanaian women, sometimes lured with legitimate job offers, and girls are sex trafficked in West Africa, the Middle East, and Europe; Ghanaian men fraudulently recruited for work in the Middle East are subjected to forced labor or prostitution, and a few Ghanaian adults have been identified as victims of false labor in the US; women and girls from Vietnam, China, and neighboring West African countries are sex trafficked in Ghana; the country is also a transit point for sex trafficking from West Africa to Europe.
Guinea-Bissau	Guinea-Bissau is a source country for children subjected to forced labor and sex trafficking; the extent to which adults are trafficked for forced labor or forced prostitution is unclear; boys are forced into street vending in Guinea-Bissau and manual labor, agriculture, and mining in Senegal, while girls may be forced into street vending, domestic service, and, to a lesser extent, prostitution in Guinea and Senegal; some Bissau-Guinean boys at Koranic schools are forced into begging by religious teachers.
Guinea	Guinea is a source, transit, and, to a lesser extent, a destination country for men, women, and children subjected to forced labor and sex trafficking; the majority of trafficking victims are Guinean children, and trafficking is more prevalent among Guineans than foreign national migrants; Guinean girls are subjected to domestic servitude and commercial sexual exploitation, while boys are forced to beg or to work as street vendors, shoe shiners, or miners; Guinea is a source country and transit point for West African children forced to work as miners in the region; Guinean women and girls are subjected to domestic servitude and sex trafficking in West Africa, the Middle East, the US, and increasingly Europe, while Thai, Chinese, and Vietnamese women are forced into prostitution and some West Africans are forced into domestic servitude in Guinea.
Guyana	Guyana is a source and destination country for men, women, and children subjected to sex trafficking and forced labor – children are particularly vulnerable; women and girls from Guyana, Venezuela, Suriname, Brazil, and the Dominican Republic are forced into prostitution in Guyana's interior mining communities and urban areas; forced labor is reported in mining, agriculture, forestry, domestic

	service, and shops; Guyanese nationals are also trafficked to Suriname, Jamaica, and other Caribbean countries for sexual exploitation and forced labor.
Haiti	Haiti is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; most of Haiti's trafficking cases involve children in domestic servitude vulnerable to physical and sexual abuse; dismissed and runaway child domestic servants often end up in prostitution, begging, or street crime; other exploited populations included low-income Haitians, child laborers, and women and children living in IDP camps dating to the 2010 earthquake; Haitian adults are vulnerable to fraudulent labor recruitment abroad and, along with children, may be subjected to forced labor in the Dominican Republic, elsewhere in the Caribbean, South America, and the US; Dominicans are exploited in sex trafficking and forced labor in Haiti.
Iran	Iran is a source, transit, and destination country for men, women, and children subjected to sex trafficking and forced labor; organized groups sex traffic Iranian women and children in Iran and to the UAE and Europe; the transport of girls from and through Iran en route to the Gulf for sexual exploitation or forced marriages is on the rise; Iranian children are also forced to work as beggars, street vendors, and in domestic workshops; Afghan boys forced to work in construction or agriculture are vulnerable to sexual abuse by their employers; Pakistani and Afghan migrants being smuggled to Europe often are subjected to forced labor, including debt bondage.
Jamaica	Jamaica is a source and destination country for children and adults subjected to sex trafficking and forced labor; sex trafficking of children and adults occurs on the street, in night clubs, bars, massage parlors, and private homes; child sex tourism is a problem in resort areas; Jamaicans have been subjected to sexual exploitation or forced labor in the Caribbean, Canada, the US, and the UK, while foreigners have endured conditions of forced labor in Jamaica or aboard foreign-flagged fishing vessels operating in Jamaican waters; a high number of Jamaican children are reported missing.
North Korea	North Korea is a source country for men, women, and children who are subjected to forced labor and sex trafficking; many North Korean workers recruited to work abroad under bilateral contracts with foreign governments, most often Russia and China, are subjected to forced labor and do not have a choice in the work the government assigns them, are not free to change jobs, and face government reprisals if they try to escape or complain to outsiders; tens of thousands of North Koreans, including children, held in prison camps are subjected to forced labor, including logging, mining, and farming; many North Korean women and girls, lured by promises of food, jobs, and freedom, have migrated to China illegally to escape poor social and economic conditions only to be forced into prostitution, domestic service, or agricultural work through forced marriages.
Kuwait	Kuwait is a destination country for men and women subjected to forced labor and, to a lesser degree, forced prostitution; men and women migrate from South and Southeast Asia, Egypt, the Middle East, and increasingly Africa to work in Kuwait, most of them in the domestic service, construction, and sanitation sectors; although most of these migrants enter Kuwait voluntarily, upon arrival some are subjected to conditions of forced labor by their sponsors and labor agents, including debt bondage; Kuwait's sponsorship law restricts workers' movements and penalizes them for running away from abusive workplaces, making domestic workers particularly vulnerable to forced labor in private homes.
Laos	Laos is a source and, to a lesser extent, transit and destination country for men, women, and children subjected to forced labor and sex trafficking; Lao economic migrants may encounter conditions of forced labor or sexual exploitation in destination countries, most often Thailand; Lao women and girls are exploited in Thailand's commercial sex trade, domestic service, factories, and agriculture; a small, possibly growing, number of Lao women and girls are sold as brides in China and South Korea and subsequently sex trafficked; Lao men and boys are victims of forced labor in the Thai fishing, construction, and agriculture industries; some Lao children, as well as Vietnamese and Chinese women and girls, are subjected to sex trafficking in Laos; other Vietnamese and Chinese, and possibly Burmese, adults and girls transit Laos for sexual and labor exploitation in neighboring countries, particularly Thailand.
Lebanon	Lebanon is a source and destination country for women and children subjected to forced labor and sex trafficking and a transit point for Eastern European women and children subjected to sex trafficking in other Middle Eastern countries; women and girls from South and Southeast Asia and an increasing number from East and West Africa are recruited by agencies to work in domestic service but are subject to conditions of forced labor; under Lebanon's artiste visa program, women from Eastern Europe, North Africa, and the Dominican Republic enter Lebanon to work in the adult entertainment industry but are often forced into the sex trade; Lebanese children are reportedly forced into street begging and commercial sexual exploitation, with small numbers of Lebanese girls sex trafficked in other Arab countries; Syrian refugees are vulnerable to forced labor and prostitution.
Lesotho	Lesotho is a source, transit, and destination country for women and children subjected to forced labor

	and sex trafficking and for men subjected to forced labor; in Lesotho and South Africa, Basotho women and children are subjected to domestic servitude, and Basotho children increasingly endure commercial sexual exploitation; some Basotho men who voluntarily migrate to South Africa for work become victims of forced labor in agriculture and mining or are coerced into committing crimes; foreign nationals continue to traffic fellow citizens in Lesotho.
Libya	Libya is a destination and transit country for men and women from sub-Saharan Africa and Asia subjected to forced labor and forced prostitution; migrants who seek employment in Libya as laborers and domestic workers or who transit Libya en route to Europe are vulnerable to forced labor; private employers also exploit migrants from detention centers as forced laborers on farms and construction sites, returning them to detention when they are no longer needed; some sub-Saharan women are reportedly forced to work in Libyan brothels, particularly in the country's south; since 2013, militia groups and other informal armed groups, including some affiliated with the government, are reported to conscript Libyan children under the age of 18; large-scale violence driven by militias, civil unrest, and increased lawlessness increased in 2014, making it more difficult to obtain information on human trafficking.
Malaysia	Malaysia is a destination and, to a lesser extent, a source and transit country for men, women, and children subjected to forced labor and women and children subjected to sex trafficking; Malaysia is mainly a destination country for foreign workers who migrate willingly from countries, including Indonesia, Bangladesh, the Philippines, Nepal, Burma, and other Southeast Asian countries, but subsequently encounter forced labor or debt bondage in agriculture, construction, factories, and domestic service at the hands of employers, employment agents, and labor recruiters; women from Southeast Asia and, to a much lesser extent, Africa, are recruited for legal work in restaurants, hotels, and salons but are forced into prostitution; refugees, including Rohingya adults and children, are not legally permitted to work and are vulnerable to trafficking; a small number of Malaysians are trafficked internally and subjected to sex trafficking abroad.
Maldives	Maldives is a destination country for men, women, and children subjected to forced labor and sex trafficking and a source country for women and children subjected to labor and sex trafficking; primarily Bangladeshi and Indian migrants working both legally and illegally in the construction and service sectors face conditions of forced labor, including fraudulent recruitment, confiscation of identity and travel documents, nonpayment and withholding of wages, and debt bondage; a small number of women from Asia, Eastern Europe, and former Soviet states are trafficked to Maldives for sexual exploitation; Maldivian women may be subjected to sex trafficking domestically or in Sri Lanka; some Maldivian children are transported to the capital for domestic service, where they may also be victims of sexual abuse and forced labor.
Mali	Mali is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; internal trafficking is more prevalent than transnational trafficking, but foreign women and girls are forced into domestic servitude, agricultural labor, and support roles in gold mines, as well as subjected to sex trafficking; Malian boys are forced to work in agricultural settings, gold mines, the informal commercial sector and to beg within Mali and neighboring countries; Malians and other Africans who travel through Mali to Mauritania, Algeria, or Libya in hopes of reaching Europe are particularly at risk of becoming victims of human trafficking; men and boys, primarily of Songhai ethnicity, are subjected to debt bondage in the salt mines of Taoudenni in northern Mali; some members of Mali's Tamachek community are subjected to hereditary slavery-related practices; Malian women and girls are victims of sex trafficking in Gabon, Libya, Lebanon, and Tunisia; the recruitment of child soldiers by armed groups in northern Mali decreased.
The Marshall Islands	The Marshall Islands is a source and destination country for Marshallese women and girls and women from East Asia subjected to sex trafficking; Marshallese and foreign women are forced into prostitution in businesses frequented by crew members of fishing and transshipping vessels that dock in Majuro; some Chinese women are recruited to the Marshall Islands with promises of legitimate work and are subsequently forced into prostitution.
Mauritania	Mauritania is a source and destination country for men, women, and children subjected to forced labor and sex trafficking; adults and children from traditional slave castes are subjected to slavery-related practices rooted in ancestral master-slave relationships; Mauritanian boy students called talibes are trafficked within the country by religious teachers for forced begging; Mauritanian girls, as well as girls from Mali, Senegal, The Gambia, and other West African countries, are forced into domestic servitude; Mauritanian women and girls are forced into prostitution domestically or transported to countries in the Middle East for the same purpose, sometimes through forced marriages.
Mauritius	Mauritius is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; Mauritian girls are induced or sold into prostitution, often by peers, family members, or businessmen offering other forms of employment; Mauritian adults have been

	identified as labor trafficking victims in the UK, Belgium, and Canada, while Mauritian women from Rodrigues Island are also subject to domestic servitude in Mauritius; Malagasy women transit Mauritius en route to the Middle East for jobs as domestic servants and subsequently are subjected to forced labor; Cambodian men are victims of forced labor on foreign fishing vessels in Mauritius' territorial waters; other migrant workers from East and South Asia and Madagascar are also subject to forced labor in Mauritius' manufacturing and construction sectors.
Namibia	Namibia is a country of origin and destination for children and, to a lesser extent, women subjected to forced labor and sex trafficking; victims, lured by promises of legitimate jobs, are forced to work in urban centers and on commercial farms; traffickers exploit Namibian children, as well as children from Angola, Zambia, and Zimbabwe, for forced labor in agriculture, cattle herding, domestic service, fishing, and street vending; children are also forced into prostitution, often catering to tourists from southern Africa and Europe; San and Zemba children are particularly vulnerable; foreign adults and Namibian adults and children are reportedly subjected to forced labor in Chinese-owned retail, construction, and fishing operations.
Pakistan	Pakistan is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; the largest human trafficking problem is bonded labor in agriculture, brickmaking and, to a lesser extent, fishing, mining and carpet-making; children are bought, sold, rented, and placed in forced begging rings, domestic service, small shops, brick-making factories, or prostitution; militant groups also force children to spy, fight, or die as suicide bombers, kidnapping the children or getting them from poor parents through sale or coercion; women and girls are forced into prostitution or marriages; Pakistani adults migrate to the Gulf States and African and European states for low-skilled jobs and sometimes become victims of forced labor, debt bondage, or prostitution; foreign adults and children, particularly from Afghanistan, Bangladesh, and Sri Lanka, may be subject to forced labor, and foreign women may be sex trafficked in Pakistan, with refugees and ethnic minorities being most vulnerable.
Papua New Guinea	Papua New Guinea is a source and destination country for men, women, and children subjected to sex trafficking and forced labor; foreign and Papua New Guinean women and children are subjected to sex trafficking, domestic servitude, forced begging, and street vending; parents may sell girls into forced marriages to settle debts or as peace offerings or trade them to another tribe to forge a political alliance, leaving them vulnerable to forced domestic service, or, in urban areas, they may prostitute their children for income or to pay school fees; Chinese, Malaysian, and local men are forced to labor in logging and mining camps through debt bondage schemes; migrant women from Indonesia, Malaysia, Thailand, China, and the Philippines are subjected to sex trafficking and domestic servitude at logging and mining camps, fisheries, and entertainment sites.
Qatar	Qatar is a destination country for men, women, and children subjected to forced labor, and, to a much lesser extent, forced prostitution; the predominantly foreign workforce migrates to Qatar legally for low- and semi-skilled work but often experiences situations of forced labor, including debt bondage, delayed or nonpayment of salaries, confiscation of passports, abuse, hazardous working conditions, and squalid living arrangements; foreign female domestic workers are particularly vulnerable to trafficking because of their isolation in private homes and lack of protection under Qatari labor laws; some women who migrate for work are also forced into prostitution.
Russia	Russia is a source, transit, and destination country for men, women, and children who are subjected to forced labor and sex trafficking; with millions of foreign workers, forced labor is Russia's predominant human trafficking problem and sometimes involves organized crime syndicates; workers from Russia, other European countries, Central Asia, and East and Southeast Asia, including North Korea and Vietnam, are subjected to forced labor in the construction, manufacturing, agricultural, textile, grocery store, maritime, and domestic service industries, as well as in forced begging, waste sorting, and street sweeping; women and children from Europe, Southeast Asia, Africa, and Central Asia are subject to sex trafficking in Russia; Russian women and children are victims of sex trafficking domestically and in Northeast Asia, Europe, Central Asia, Africa, the US, and the Middle East.
Saint Vincent and the Grenadines	Saint Vincent and the Grenadines is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; some children under 18 are pressured to engage in sex acts in exchange for money or gifts; foreign workers may experience forced labor and are particularly vulnerable when employed by small, foreign-owned companies; adults and children are vulnerable to forced labor domestically, especially in the agriculture sector.
Saudi Arabia	Saudi Arabia is a destination country for men and women subjected to forced labor and, to a lesser extent, forced prostitution; men and women from South and East Asia, the Middle East, and Africa who voluntarily travel to Saudi Arabia as domestic servants or low-skilled laborers subsequently face conditions of involuntary servitude, including nonpayment and withholding of passports; some

	migrant workers are forced to work indefinitely beyond the term of their contract because their employers will not grant them a required exit visa; female domestic workers are particularly vulnerable because of their isolation in private homes; women, primarily from Asian and African countries, are believed to be forced into prostitution in Saudi Arabia, while other foreign women were reportedly kidnapped and forced into prostitution after running away from abusive employers; children from South Asia, East Africa, and Yemen are subjected to forced labor as beggars and street vendors in Saudi Arabia, facilitated by criminal gangs.
The Solomon Islands	The Solomon Islands is a source and destination country for local adults and children and Southeast Asian men and women subjected to forced labor and forced prostitution; women from China, Indonesia, Malaysia, and the Philippines are recruited for legitimate work and upon arrival are forced into prostitution; men from Indonesia and Malaysia recruited to work in the Solomon Islands' mining and logging industries may be subjected to forced labor; local children are forced into prostitution near foreign logging camps, on fishing vessels, at hotels, and entertainment venues; some local children are also sold by their parents for marriage to foreign workers or put up for "informal adoption" to pay off debts and then find themselves forced into domestic servitude or forced prostitution.
South Sudan	South Sudan is a source and destination country for men, women, and children subjected to forced labor and sex trafficking; South Sudanese women and girls, particularly those who are internally displaced, orphaned, refugees, or from rural areas, are vulnerable to forced labor and sexual exploitation, often in urban centers; children may be victims of forced labor in construction, market vending, shoe shining, car washing, rock breaking, brick making, delivery cart pulling, and begging; girls are also forced into marriages and subsequently subjected to sexual slavery or domestic servitude; women and girls migrate willingly from Uganda, Kenya, Ethiopia, Eritrea, and the Democratic Republic of the Congo to South Sudan with the promise of legitimate jobs and are forced into the sex trade; inter-ethnic abductions and abductions by criminal groups continue, with abductees subsequently forced into domestic servitude, herding, or sex trafficking; in 2014, the recruitment and use of child soldiers increased significantly within government security forces and was also prevalent among opposition forces.
Sri Lanka	Sri Lanka is primarily a source and, to a lesser extent, a destination country for men, women, and children subjected to forced labor and sex trafficking; some Sri Lankan adults and children who migrate willingly to the Middle East, Southeast Asia, and Afghanistan to work in the construction, garment, and domestic service sectors are subsequently subjected to forced labor or debt bondage (incurred through high recruitment fees or money advances); some Sri Lankan women are forced into prostitution in Jordan, Maldives, Malaysia, Singapore, and other countries; within Sri Lanka, women and children are subjected to sex trafficking, and children are also forced to beg and work in the agriculture, fireworks, and fish-drying industries; a small number of women from Asia, Central Asia, Europe, and the Middle East have been forced into prostitution in Sri Lanka in recent years.
Sudan	Sudan is a source, transit, and destination country for men, women, and children who are subjected to forced labor and sex trafficking; Sudanese women and girls, particularly those from rural areas or who are internally displaced, or refugees are vulnerable to domestic servitude in country, as well as domestic servitude and sex trafficking abroad; migrants from East and West Africa, South Sudan, Syria, and Nigeria smuggled into or through Sudan are vulnerable to exploitation; Ethiopian, Eritrean, and Filipina women are subjected to domestic servitude in Sudanese homes, and East African and possibly Thai women are forced into prostitution in Sudan; Sudanese children continue to be recruited and used as combatants by government forces and armed groups.
Suriname	Suriname is a source, transit, and destination country for women and children subjected to sex trafficking and men, women, and children subjected to forced labor; women and girls from Suriname, Guyana, Brazil, and the Dominican Republic are subjected to sex trafficking in the country, sometimes in interior mining camps; migrant workers in agriculture and on fishing boats and children working in informal urban sectors and gold mines are vulnerable to forced labor; traffickers from Suriname exploit victims in the Netherlands.
Syria	As conditions continue to deteriorate due to Syria's civil war, human trafficking has increased; Syrians remaining in the country and those that are refugees abroad are vulnerable to trafficking; Syria is a source and destination country for men, women and children subjected to forced labor and sex trafficking; Syrian children continue to be forcibly recruited by government forces, pro-regime militias, armed opposition groups, and terrorist organizations to serve as soldiers, human shields, and executioners; ISIL forces Syrian women and girls and Yazidi women and girls taken from Iraq to marry its fighters, where they experience domestic servitude and sexual violence; Syrian refugee women and girls are forced into exploitive marriages or prostitution in neighboring countries, while displaced children are forced into street begging domestically and abroad.
Tanzania	Tanzania is a source, transit, and destination country for men, women, and children subjected to forced

	labor and sex trafficking; the exploitation of young girls in domestic servitude continues to be Tanzania's largest human trafficking problem; Tanzanian boys are subject to forced labor mainly on farms but also in mines and quarries, in the informal commercial sector, in factories, in the sex trade, and possibly on small fishing boats; Tanzanian children and adults are subjected to domestic servitude, other forms of forced labor, and sex trafficking in other African countries, the Middle East, Europe, and the US; internal trafficking is more prevalent than transnational trafficking and is usually facilitated by friends, family members, or intermediaries with false offers of education or legitimate jobs; trafficking victims from Burundi, Kenya, South Asia, and Yemen are forced to work in Tanzania's agricultural, mining, and domestic service sectors or may be sex trafficked.
Thailand	Thailand is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; victims from Burma, Cambodia, Laos, China, Vietnam, Uzbekistan, and India, migrate to Thailand in search of jobs but are forced, coerced, or defrauded into labor in commercial fishing, fishing-related industries, factories, domestic work, street begging, or the sex trade; some Thai, Burmese, Cambodian, and Indonesian men forced to work on fishing boats are kept at sea for years; sex trafficking of adults and children from Thailand, Laos, Vietnam, and Burma remains a significant problem; Thailand is a transit country for victims from China, Vietnam, Bangladesh, and Burma subjected to sex trafficking and forced labor in Malaysia, Indonesia, Singapore, Russia, South Korea, the US, and countries in Western Europe; Thai victims are also trafficked in North America, Europe, Africa, Asia, and the Middle East.
Timor-Leste	Timor-Leste is a source and destination country for men, women, and children subjected to forced labor and sex trafficking; Timorese women and girls from rural areas are lured to the capital with promises of legitimate jobs or education prospects and are then forced into prostitution or domestic servitude, and other women and girls may be sent to Indonesia for domestic servitude; Timorese family members force children into bonded domestic or agricultural labor to repay debts; foreign migrant women are vulnerable to sex trafficking in Timor-Leste, while men and boys from Burma, Cambodia, and Thailand are forced to work on fishing boats in Timorese waters under inhumane conditions.
Trinidad and Tobago	Trinidad and Tobago is a destination, transit, and possible source country for adults and children subjected to sex trafficking and forced labor; women and girls from Venezuela, the Dominican Republic, Guyana, and Colombia have been subjected to sex trafficking in Trinidad and Tobago's brothels and clubs; some economic migrants from the Caribbean region and Asia are vulnerable to forced labor in domestic service and the retail sector; the steady flow of vessels transiting Trinidad and Tobago's territorial waters may also increase opportunities for forced labor for fishing; international crime organizations are increasingly involved in trafficking, and boys are coerced to sell drugs and guns; corruption among police and immigration officials impedes anti-trafficking efforts.
Tunisia	Tunisia is a source, destination, and possible transit country for men, women, and children subjected to forced labor and sex trafficking; Tunisia's increased number of street children, rural children working to support their families, and migrants who have fled unrest in neighboring countries are vulnerable to human trafficking; organized gangs force street children to serve as thieves, beggars, and drug transporters; Tunisian women have been forced into prostitution domestically and elsewhere in the region under false promises of legitimate work; East and West African women may be subjected to forced labor as domestic workers.
Turkmenistan	Turkmenistan is a source country for men, women, and children subjected to forced labor and sex trafficking; Turkmen who migrate abroad are forced to work in the textile, agriculture, construction, and domestic service industries, while women and girls may also be sex trafficked; in 2014, men surpassed women as victims; Turkey and Russia are primary trafficking destinations, followed by the Middle East, South and Central Asia, and other parts of Europe; Turkmen also experience forced labor domestically in the informal construction industry; participation in the cotton harvest is still mandatory for some public sector employees.
Ukraine	Ukraine is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; Ukrainian victims are sex trafficked within Ukraine as well as in Russia, Poland, Iraq, Spain, Turkey, Cyprus, Greece, Seychelles, Portugal, the Czech Republic, Israel, Italy, South Korea, Moldova, China, the United Arab Emirates, Montenegro, UK, Kazakhstan, Tunisia, and other countries; small numbers of foreigners from Moldova, Russia, Vietnam, Uzbekistan, Pakistan, Cameroon, and Azerbaijan were victims of labor trafficking in Ukraine; Ukrainian recruiters most often target Ukrainians from rural areas with limited job prospects using fraud, coercion, and debt bondage.
Uzbekistan	Uzbekistan is a source country for men, women, and children subjected to forced labor and women and children subjected to sex trafficking; government-compelled forced labor of adults remained endemic during the 2014 cotton harvest; despite a decree banning the use of persons under 18, children

	were mobilized to harvest cotton by local officials in some districts; in some regions, local officials forced teachers, students, private business employees, and others to work in construction, agriculture, and cleaning parks; Uzbekistani women and children are victims of sex trafficking domestically and in the Middle East, Eurasia, and Asia; Uzbekistani men and, to a lesser extent, women are subjected to forced labor in Kazakhstan, Russia, and Ukraine in the construction, oil, agriculture, retail, and food sectors.
Venezuela	Venezuela is a source and destination country for men, women, and children subjected to sex trafficking and forced labor; Venezuelan women and girls, sometimes lured from poor interior regions to urban and tourist areas, are trafficked for sexual exploitation within the country, as well as in the Caribbean; Venezuelan children are exploited, frequently by their families, in domestic servitude; people from South America, the Caribbean, Asia, and Africa are sex and labor trafficking victims in Venezuela; thousands of Cuban citizens, particularly doctors, who work in Venezuela on government social programs in exchange for the provision of resources to the Cuban Government experience conditions of forced labor.
Yemen	Yemen is a source and, to a lesser extent, transit and destination country for men, women, and children subjected to forced labor and women and children subjected to sex trafficking; trafficking activities grew in Yemen in 2014, as the country's security situation deteriorated and poverty worsened; armed groups increased their recruitment of Yemeni children as combatants or checkpoint guards, and the Yemeni military and security forces continue to use child soldiers; some other Yemeni children, mostly boys, migrate to Yemeni cities or Saudi Arabia and, less frequently Oman, where they end up as beggars, drug smugglers, prostitutes, or forced laborers in domestic service or small shops; Yemeni children increasingly are also subjected to sex trafficking in country and in Saudi Arabia; tens of thousands of Yemeni migrant workers deported from Saudi Arabia and thousands of Syrian refugees are vulnerable to trafficking; additionally, Yemen is a destination and transit country for women and children from the Horn of Africa who are looking for work or receive fraudulent job offers in the Gulf states but are subjected to sexual exploitation or forced labor upon arrival; reports indicate that adults and children are still sold or inherited as slaves in Yemen.
Zimbabwe	Zimbabwe is a source, transit, and destination country for men, women, and children subjected to forced labor and sex trafficking; Zimbabwean women and girls from towns bordering South Africa, Mozambique, and Zambia are subjected to forced labor, including domestic servitude, and prostitution catering to long-distance truck drivers; Zimbabwean men, women, and children experience forced labor in agriculture and domestic servitude in rural areas; family members may recruit children and other relatives from rural areas with promises of work or education in cities and towns where they end up in domestic servitude and sex trafficking; Zimbabwean women and men are lured into exploitative labor situations in South Africa and other neighboring countries.
World	The International Labour Organization conservatively estimated that 20.9 million people in 2012 were victims of forced labor, representing the full range of human trafficking (also referred to as "modern-day slavery") for labor and sexual exploitation; about one-third of reported cases involved crossing international borders, which is often associated with sexual exploitation; trafficking in persons is most prevalent in southeastern Europe, Eurasia, and Africa and least frequent in EU member states, Canada, the US, and other developed countries (2012).
SOURCE: CIA WORLD FACT BOOK 2017 https://www.cia.gov/library/publications/the-world-factbook/fields/2196.html	

Children

UNICEF estimates the current number of child laborers aged 5 to 17 at 168,000,000 children, down 1/3 from a 2000 estimate of 246,000,000 children. (267) If consumers made more conscience buying decisions about where the products are made and by what companies, ultimately avoiding products from those countries and companies that condone child labor and sweatshops, would this not help to make a difference? If the governments of western nations enacted regulations to stop companies from engaging in child labor overseas while also banning the importation of products which are manufactured by children and in sweatshops, would this help in eliminating child labor and sweatshops?

Daily, in every country around the world children are victims of violence. The World Health Organization reports that every 5 minutes a child dies as a result of violence, and that 1,000,000,000 children have experienced physical, sexual, or psychological violence in the past year. (681) If better morals were instilled into society through example and education, in addition to more laws being enacted and rigorously enforced, could this not help to eliminate child violence?

Although child marriage is rapidly declining in the United States, a verified 167,000 children in 38 U.S. States, some as young as 10, were married between 2000 and 2010, and many were married to adult men often with a significant age difference. As the other 12 states and Washington, D.C. could not provide data, the non-profit Unchained at Last using the verified data estimated the total for all 50 states to be 248,000 children. (487) How can child marriage still be legal and condoned or simply ignored by so many in the United States?

Many children in Western societies are now raised in isolation and separate from their parents starting at birth. Newborns are often placed in a cradle located in a separate room and monitored with an electronic device. They are not carried naturally, but rather in a stroller. They are fed formula made with dairy based ingredients and not breastmilk. And some are even educated solely by television, the Internet, or in government or private schools. These children are separated from their parents at birth and pushed out of the nest as soon as possible, all for the convenience of the parent. They are raised by technology, a babysitter, and without direct love from the parents. There are even videos and apps which specifically target infants and children, not to educate them, but rather to occupy them and make profits from. How would *Homo sapiens* develop if they were not introduced so early in life to the Internet, television, apps, and other things they cannot comprehend, but were instead exposed to nature for the first few years?

Many children are also not allowed to be themselves or develop naturally, with so many children being forced to imitate the parents and follow a path set out for them by the parent which tries to make the child over in their own image. (e.g. the father is a businessman and thus the child must carry on the legacy of being a businessperson) Children are often objectified and are basically like a doll to some parents which have their children's ears pierced or dressing them in ridiculous outfits. They are often labeled as something unrealistic like a princess or they are called special, the best, or another faux classification which too often sets them up for future disappointment when they come to the realization that they are not what they've been labeled.

Boxing, football, ice hockey, and other barbaric contact sports have all been linked to long-term brain damage, a wide range of physical injuries, and even permanent disabilities, so why are youth encouraged to participate? Why are so many male children given guns and military toys with which to mimic acts of war? Is it not enough evidence that violent toys beget real violence, when children are being shot in the streets by police officers because they are holding a toy gun? Why are so many female children given a baby doll to play with and pretend they are mothers, and later given a sexualized Barbie type doll to play with? How different would the world be if *Homo sapiens* were educated from youth with more scientific and historical facts versus being brainwashed by religious or other negative sources? How much different would the world be if more *Homo sapiens* were taught to live simply and try to help others instead of being taught to spend a lifetime focusing on materialism and greed? What would the world be like if it were similar to that proposed in Richard Evans Farson's 1978 *'Birthrights'* where children vote, work, choose their education and guardians, and have other adult privileges and rights?

Women

Women have been oppressed by men since time immemorial, and have only recently begun to gain rights, freedoms, and equality in most parts of the world which most men have had for centuries. For thousands of years women have been sexually assaulted, sexually harassed, raped, physically abused, murdered, degraded, humiliated, intimidated, objectified, and made to feel inferior to men. They have been enslaved and also forced into marriage, pregnancy, and prostitution. From foot binding to the burqa women's physical appearances have often been controlled by men for thousands of years, and in a few places in the world this control is still exerted even today. Too often in today's society women are objectified through sex and beauty, and this objectification is prevalent in everything from entertainment to the marketing of products. Women are sold a lie by corporations which promote an image of artificial beauty through fashion and cosmetics, while being discouraged to accept their natural unaltered form of beauty. Women are often paid less wages than men for the same exact job, while also being discriminated against in the workplace by not being given leadership roles or other promotions. Their reproductive rights are oppressed by religions, politicians, and doctors which attempt to control them through

antiquated laws, deception, and fearmongering tactics based on their ideology and not what a woman truly wants or needs. In 2016, of the 73,700,000 children in the United States 17,200,000 were living with the mother only, compared with 3,000,000 which lived with the father only. (675)

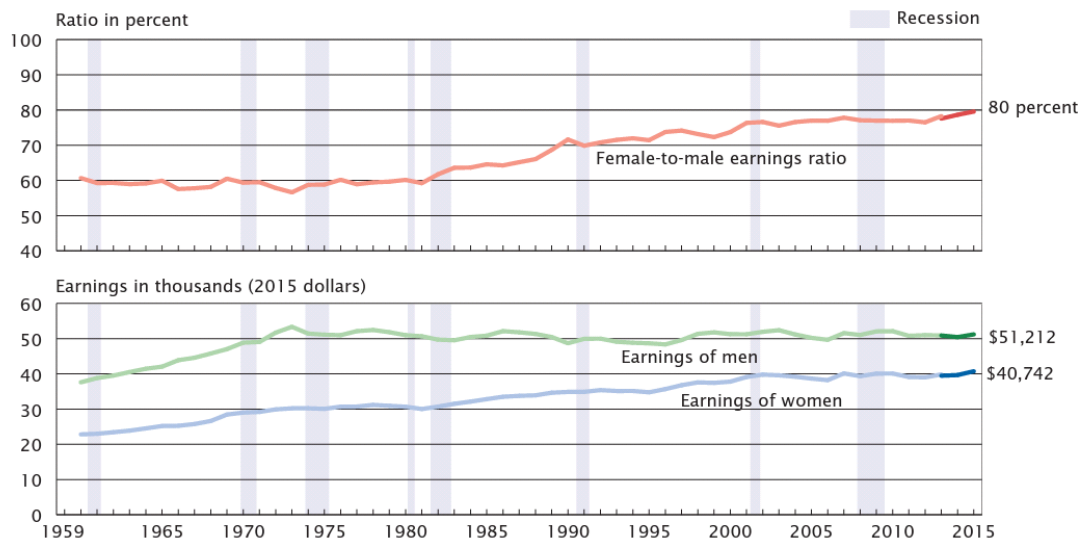
Over the last 24 years, there has been a huge rise in the number of caesarean sections with many not being medically justifiable, but being done instead either because of fear of pain, the misconception that a caesarean section is safer for the baby, convenience for either the health professionals or the mother and family, or for cultural reasons based on luck and fate. Based on the data from 121 countries between 1990 and 2014, the global average caesarean section rate has increased from 6.7% to 19.1%. The highest caesarean section rates were in Latin America and the Caribbean region with 40.5% of children being born by caesarean section, 32.3% in North America, 31.1% in Oceania, 25% in Europe, and 19.2% in Asia. (693) Male chauvinism, modern societies demand for labor, and lack of family or any other form of support too often puts a heavy burden on women and children as well. In many societies around the world, and more especially in western societies, women are expected to be up and about during pregnancy or during their menstrual cycle, times when most women could possibly use more rest and support from their male counterparts. Globally, only 44% of newborns are put to the breast within the first hour after birth, and the overall rate of infants under 6 months of age which are exclusively breastfeed is only 40%. (488) Breast feeding in public is often shunned in many western societies, and women are often considered abnormal if they want to practice traditional natural birth outside a hospital setting. Many women do not breastfeed or stop breastfeeding perhaps early than they should because of the necessity to return to work, and because dairy based infant formulas are now so widely available and often encouraged over breastmilk. If breastfeeding can reduce malnutrition rates and bolster a child's brain development, why then isn't the practice being encouraged more by governments through education and longer paid maternity leave? The Yana treated women giving birth or menstruating quite differently, which Theodora Kroeber describes as,

“Nowhere was it expected, or indeed allowed, that the mother should at once be up and back to work. She was kept to her bed and to a special diet, cared for by her mother or another older woman and by her husband until the infant's cord had healed and dropped off, by which time the mother would normally have the milk flow and nursing established. Whoever was caring for her helped her also in this, gently sucking off the colostrum if the baby did not do so, and giving the baby a little acorn gruel to suck at until he learned to nurse properly. The “strong woman” tradition of northern European peasantry, in which the mother “has” her baby out in the field and returns forthwith to scything or other field work in which she was engaged up to the actual moment of birth, not only was unknown to our Indians; the idea of such a procedure would have disgusted and outraged their sense of propriety and their understanding of medicine and healing.”

“For six days each month-the ritual if not the actual length of her period-a woman was required to withdraw to a separate house and more or less to stay on her bed; there was the length of a moon's waxing and waning to be spent in retirement and rest following the birth of her baby, during which she was considered at most convalescent.” (310)

The global participation rate of women in national governments is around 23%, and currently only around 20% of the United States Senate and House of Representatives are women, with the first being elected in the early 20th century. Worldwide many government positions are now held by women the for the first time due to a dramatic political shift which began in the 21st century, a positive change which will hopefully only continue. In Bolivia, 53% of the parliament are women and 39% of the French parliament are women. In 2016, Faith Spotted Eagle became the first indigenous *Homo sapiens* of the United States to receive an electoral vote for President of the United States, in addition to also being one of the first of two women to receive a presidential electoral vote. Women are now more involved in businesses, organizations, and governments throughout the world than ever before, and one could argue that they have made far more positive changes for the world in the short span of 50 years than men have throughout all of history. Perhaps more women will enter leadership roles and become the majority in power giving society the motherly type love it needs to correct itself, instead of the violent and tyrannical shadow which men have cast over the world during the last 10,000 years. Many women live life with more love, empathy, and passion than most men, and this could perhaps be the qualities which not only reverse the current path of self-destruction which *Homo sapiens* are going down, but also help in creating a new path of coexistence on Earth. Will this increasing participation of women in businesses, organizations, and governments ultimately be the salvation *Homo sapiens* and planet Earth need? What would the governments of the world be like if women had equality worldwide and held half or more of all government positions?

Figure 2.
Female-to-Male Earnings Ratio and Median Earnings of Full-Time, Year-Round Workers 15 Years and Older by Sex: 1960 to 2015



Note: The data for 2013 and beyond reflect the implementation of the redesigned income questions. The data points are placed at the midpoints of the respective years. Data on earnings of full-time, year-round workers are not readily available before 1960. For more information on recessions, see Appendix A. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see <www2.census.gov/programs-surveys/cps/techdocs/cpsmar16.pdf>.
 Source: U.S. Census Bureau, Current Population Survey, 1961 to 2016 Annual Social and Economic Supplements.

Family and Individualism

The traditional family unit that existed 100 years ago is now nearly nonexistent and has been replaced by individualism and detachment, along with less and less households having both parents. In the United States between 1960 and 2016, the percentage of children living in families with two parents decreased from 88% to 69%. (675) Families and friends now seem to communicate more with text messaging than actual real conversation, and too often one observes families dining out at a restaurant with each family member engrossed in a mobile device playing a game, surfing the Internet, or engaged in social media. Families today appear as just individuals living in groups with everyone doing separate things while being forced to come together at set intervals during the day, week, or year. This pointless forced socialization in not only families, but also with other members of society can be seen throughout history. Henry David Thoreau wrote,

"Society is commonly too cheap. We meet at very short intervals, not having had time to acquire any new value for each other. We meet at meals three times a day, and give each other a new taste of that old musty cheese that we are. We have had to agree on a certain set of rules, called etiquette and politeness, to make this frequent meeting tolerable and that we need not come to open war. We meet at the post-office, and at the sociable, and about the fireside every night; we live thick and are in each other's way, and stumble over one another, and I think that we thus lose some respect for one another. Certainly less frequency would suffice for all important and hearty communications." (648)

Some *Homo sapiens* have been taught from an early age to be more individualistic, self-centered, and ignore everyone and everything else in the world around them. While some other *Homo sapiens* have the mentality that they are here for only a few short years and are going to die anyway, so they may as well be happy and do whatever they want, no matter the consequences to the environment and society. This disregard for not only others, but for the Earth itself and future generations is an extremely selfish and asinine way of thinking and acting. Many neighbors do not even know each other, but instead live next to each other without ever even speaking. Ina Corrine Brown said,

"In the Modern Western world, the interdependence of human beings is obscured but our emphasis on individualism and by

the impersonal nature of many of the relationships characteristic of an urban, industrial, money economy. Only in times of personal or community disaster do many people become aware of the extent of their dependence on others and that there are necessities which money cannot buy. Yet there is a real sense in which we become human only in association with other people, and persons who attempt to live in complete isolation are usually those who already are to some degree detached from reality.” (23)

Frivolous Entertainment and Idolization

Many *Homo sapiens* have replaced the wonder and amazement of nature, science, and the pursuit of knowledge with artificially created time consuming technology and entertainment resulting in a plugged-in society that is extremely out of touch with not only nature, science, and the pursuit of knowledge, but often with society itself. This has also led to an entertained society with many *Homo sapiens* being good at some repetitive pointless game which gives them a false sense of satisfaction and accomplishment, but which is mostly clueless about the reality of the world around them while also making them apathetic regarding environmental and social issues. And while this pacified society may be good for some businesses and politicians, it has ultimately led to the dumbing down of many in society. Neil Postman wrote,

“Tyrants of all varieties have always known about the value of providing the masses with amusements as a means of pacifying discontent.” (677)

Technology and the Internet can be a positive thing for society when it is used properly and in moderation, otherwise it can have detrimental effects on the members of society. Some *Homo sapiens* are so absorbed with technology and the Internet to the point of addiction and are unable to unplug, ultimately becoming nothing more than drones which make billions of dollars for websites and gaming companies through advertising and in-app purchases. Future generations may look at their ancestors and wonder how they were force fed a diet of synthetic reality, and why they so willingly submitted to it with little to no resistance. Many *Homo sapiens* spend hours each day on social media, surfing the web, watching videos, and gaming, but will not spend 1, 2, or even 3 hours a week devoting time to volunteering and making a positive impact on society or the Earth. How clean would the Earth be if all *Homo sapiens* spent 1 hour each week picking up the garbage which litters Earth? How much more educated would children be if more adults tutored or mentored a child in need a few hours a week?

Much of the so called educational TV, documentary films, and other related media today is based on popularity, fantasy, and sensationalism, not education, science, or content which encourages good morals or shows the actual reality of the world. Over the last 15 years, pseudo reality shows have taken center stage and consist of content that is the farthest thing from reality, and the acting is so bad that it is plainly obvious that it only fools the gullible which tune in and perpetuate this ridiculousness. Many of these reality shows are nothing more than a camera following around an ignorant narcissistic has-been celebrity or are based on the fantasy of becoming a star. Many television shows and networks which have a theme of science and history mostly broadcast series based on a hoax, myth, pseudo-science, pseudo history, conspiracy, or entertaining fiction, not real science and accurate history. Skewed history and selective facts or scientific data are intermixed with entertaining aliens, psychics, ghosts, or mythological elements to a gullible audience eager to believe and perpetuate the entertaining lie.

The idolization of entertainers, religious figures, political leaders, or any individual is senseless and pointless. *Homo sapiens* give awards and accolades to so many who are the least deserving of them, and those who receive none are ignored or even persecuted during their lifetime only to be vindicated later and then revered long after they are dead. Why are scientist like Fritz Haber who invented and advocated for chemical weapons, or Hermann Staudinger who invented plastic, or Egas Moniz who developed the lobotomy awarded a Nobel Prize for work that has had such a negative impact on humanity and the Earth, while other far more deserving individuals may or may not even be nominated and will never receive one? Albert Einstein said,

"Let every man be respected as an individual and no man idolized." (51)

The Mainstream News Media

Much of the mainstream news media presents nothing more than entertainment through sensationalism and dramatic presentation which targets a gullible audience that tunes in to anxiously await updates on pseudo breaking news stories, often which contain little substance or purpose other than to entertain and gain ratings. Most of the mainstream news media often do not focus on truly important social and environmental issues, but instead place an emphasis on the deaths of famous *Homo sapiens*, sports, politics, weather, entertainment, business, celebrities, trends, shopping, advertising new products, food, pets, health, extreme murders, crime, violence, drugs, religion, or some other morbid and meaningless story which contains no real value. And while most of these topics are important and should be covered to some extent, by making them the entire focal point of the news, it has led to so few mainstream news agencies focusing on or even covering other crucial subject matter, such as global warming, nature, environmental issues, indigenous issues, pollution, war, human rights, science, education, or other pertinent subjects which are actually affecting the world and desperately need attention brought to them. When and if these subjects are ever covered by the mainstream news media it is usually very brief.

Some of the mainstream news media as well as the entertainment industry have used love, fear, hate, worry, sadness, and other emotions to manipulate the masses by feeding on these emotions to create an illusory and impossible fantasy world that often eliminates reality. Some of the mainstream news media often presents stories with a very biased perspective, which can have vast influence on public opinion, rather than simply being factual and informative about the truly important social and environmental issues affecting the entire world. Many mainstream news sources are extremely redundant, with most all mainstream news agencies focusing on the same exact news stories only being slightly reworded or being told from a different biased perspective. The 24/7 news networks run the same 20 minutes of news stories repeated for hours on end until they finally change, and then repeat the endless repetition of news again, often focusing on only one news story for hours and even days at a time, while ignoring the hundreds of other news stories which also matter. With this type of reporting, one might be led to believe they are in a small world where nothing of any real importance is going on other than the same irrelevant sensationalist new stories, when in fact it is just the opposite. News stories are usually abandoned after being reported on once, and often little to no updates on the progression of a news story or outcome is given and no closure to a developing news story is ever provided. Most of the the mainstream news media is more concerned about being the first to report the news than with actually getting the facts first and making an accurate report. Even with Internet resources like Snopes, CrossCheck, The Skeptics Society, PolitiFact, and others exposing the truth, inaccurate news and rumors are still ever present. How much more reliable would the mainstream news be if they used these and other accurate resources to fact check all of their news stories, instead of reporting lies based on sensationalism and instant information?

Negativity and crime seem to dominate much of the mainstream news, leading some to believe that with all the murder and mayhem being reported that the world it is a far more dangerous place than it actually is, and can result in a paranoid society buying more guns, putting more locks on their doors, and isolating themselves even further from the outside world. If one were to look at the actual crime statistics issued by the Federal Bureau of Investigation (FBI), they would see that violent crimes as well as property crimes have actually decreased dramatically. Nationwide violent crimes (murder and nonnegligent manslaughter, legacy rape, revised rape, robbery, and aggravated assault) have fallen from their peak in 1992 of 1,932,274 incidents to 1,197,987 in 2014, and property crime (burglary, larceny-theft, and motor vehicle theft) have fallen from their peak in 1991 of 12,961,116 incidents to 8,277,829 incidents in 2014. (685) Whereas the frequently underreported white-collar crimes (Ponzi schemes, fraud, insider trading, bribery, labor racketeering, embezzlement, cybercrime, money laundering, forgery, and identity theft) have increased by 847% from 325,519 crimes in 2001 to 3,083,379 crimes in 2015 being reported to the Federal Trade Commission (FTC). (686) Because of the sensationalism and negative spin which is often put on news content, along with the alarmist attitude which is projected through overdramatizing issues, many *Homo sapiens* have an unwarranted phobia regarding some issues based on rumors and false information. Most doomsday and worst-case scenarios which are often proposed will never happen, and they are used by some mainstream news media organizations to create hype and gain ratings. If news were based more on reality and the facts, would this not lead to more contemplation about valid and

positive change regarding environmental and social issues, instead of irrelevant speculations and pointless gossip? Neil Postman wrote,

“What is happening here is that television is altering the meaning of “being informed” by creating a species of information that might properly be called disinformation. I am using this word almost in the precise sense in which it is used by spies in the CIA or KGB. Disinformation does not mean false information. It means misleading information-misplaced, irrelevant, fragmented or superficial information-information that creates the illusion of knowing something but which in fact leads one away from knowing. In saying this, I do not mean to imply that television news deliberately aims to deprive Americans of a coherent, contextual understanding of their world. I mean to say that when news is packaged as entertainment, that is the inevitable result. And in saying that the television news show entertain but does not inform, I am saying something far more serious than that we are being deprived of authentic information. I am saying we are losing our sense of what it means to be well informed. Ignorance is always correctable. But what shall we do if we take ignorance to be knowledge?” (687)

There is now a tendency to label anything as ‘*fake news*’ by those being criticized or whom disagree, even though there are undeniable facts present and there is nothing fake whatsoever about it. The problem is not that there is inaccurate news or misinformation, this issue has been prevalent since the beginning of civilization and gossip first began to spread. The problem is that many *Homo sapiens* are gullible and perhaps lack education and logical thought with which to decipher the inaccurate news from real news, in addition to simply not factchecking the news themselves. Yellow journalism will most likely always be present so long as there is an uneducated gullible audience which craves such gibberish, along with some mainstream news media organizations which base news stories on sensationalism while presenting the news in an entertaining way to gain ratings. Neil Postman wrote,

“The problem is not that television presents us with entertaining subject matter but that all subject matter is presented as entertaining, which is another issue altogether.

To say it still another way: Entertainment is the supra-ideology of all discourse on television. No matter what is depicted or from what point of view, the overarching presumption is that it is there for our amusement and pleasure. That is why even on news shows which provide us daily with fragments of tragedy and barbarism, we are urged by the newscasters to “join them tomorrow.” What for? One would think that several minutes of murder and mayhem would suffice as material for a month of sleepless nights. We accept the newscasters’ invitation because we know that the “news” is not to be taken seriously, that it is all in fun, so to say. Everything about a news show tells us this-the good looks and amiability of the cast, their pleasant banter, the exciting music that opens and closes the show, the vivid film footage, the attractive commercials-all these and more suggest that what we have just seen is no cause for weeping. A news show, to put it plainly, is a format for entertainment, not education, reflection or catharsis. And we must not judge too harshly those who have framed it in this way. They are not assembling the news to be read, or broadcasting it to be heard. They are televising the news to be seen.” (678)

Real news is nothing more than facts and not opinions which can often be biased. Freedom of speech, opinions, and debate are excellent, and they are a vital part of democracy, but only in the right forum, and so long as it is not labeled as news. If news is based on opinions and is biased creating a one-sided presentation of the issues while ignoring most of the facts, then it will never truly be news, it will just be pointless gossip and slander interwoven with select facts to support it. If the public looks to the mainstream news media as a source for facts and information, then it should be delivering this, otherwise they are misleading the public and causing mass confusion, hysteria, and unnecessary paranoia through the spreading of misinformation. Most *Homo sapiens* do not have the time nor the desire to fact-check everything in the news, nor should they be expected to fact-check a news organization whose main goal and mission should be to do exactly this, and this precisely why it is essential that the mainstream news media provide factual and relevant information. If the public cannot depend on the news media organizations for this service, what good are they other than to be a source of entertainment and opinions? Shouldn’t they be labeled as entertainment or opinionated, and not news? Perhaps if more news was presented like PBS Frontline, PBS NewsHour, National Public Radio, BBC News, the Associated Press, France 24, and a few others do, then this would help in reporting the facts more accurately. Unfortunately these exemplary news organizations receive so little funding in comparison with their corporate counterparts. Perhaps if the mainstream news was based less on what information the public wants, and more on vital information they need, then the public would be far more informed about the real environmental and social issues which are occurring in the world and initiate more positive changes.

Although there are a growing number of alternative news sources since the advent of the Internet, adding to the

few reliable mainstream news sources, they are still overshadowed by the rest of the mainstream news media which is now dominated by corporations. When corporations and entertainment related companies have taken control of most of the mainstream news media sources, they have truly lost their value of being a reputable news organization. In 1983, 90% of United States media was owned by more than 50 different companies, in 2017 only 6 media conglomerates: Comcast, Newscorp, Disney, Viacom, Time Warner, and CBS controlled that same 90%. Many mainstream news agencies are nothing more than a business, and their reporting and access to their news content are based around money and how much profit can be made. When news organizations don't want to progress with technology and offer their content for free and instead require a paid subscription, they have lost their value of being a true news agency as they are basing access to news and information on money, while focusing more on the profiting of money from news and information rather than being an informative news source which spreads truth. The Aljazeera September 2016 broadcast *'US elections and the media: How did we get here?'* reported that lax regulation in addition to an absence of a strong public broadcasting system, like in some other countries, has strongly affected the coverage of US politics. And the March 2017 report *'Occupation of the American Mind'* details the information wars being waged by Israel and its supporters over the last 50 years to distort the truth about the Israeli–Palestinian conflict and win over the hearts and minds of Americans.

In parts of the world which have truly important news being reported on the media is often censored. One need only view the Reporters Without Borders yearly World Press Freedom Index to see how freedom of speech especially through the news media is silenced in so many countries around the world, and even in some democratic nations. Between 1992 and July 2017, there were 1,737 journalists which died either as a result of being murdered, caught in crossfire, or another deadly incident from covering a war or other dangerous assignment. (414) How much truth was either permanently hidden, delayed, or altered as a result of a journalists being murdered for reporting the truth? Suppressing the facts and knowledge until it is relevant based on ideology or popularity is not news, it is the control of news and the truth and does nothing more than hinder change and progress.

The reality of a situation is often censored by the news to shield the public from the what is deemed to be too graphic or from what is considered inappropriate, and although the Internet has broken down this barrier, censorship it is still prevalent within most mainstream news organizations. This content which is labeled as too graphic or inappropriate has helped to initiate change throughout history when viewers see the actual horrors of a situation like war, starving children, natural disasters, etc. As the old adages go *'if something is out of sight, it is thus out of mind'* whereas *'a picture is worth a thousand words'*, and when *Homo sapiens* see the reality of a situation through a visual presentation it cannot be denied or debated. How about an evening news summary of worldwide news and the continuous depredations done by *Homo sapiens*, instead of the current happy face which is put on the news? Perhaps if news was based more on the facts presented with real pictures uncensored, and *Homo sapiens* witnessed the real devastation which is occurring in the world instead of being censored from it, more would actually care and initiate positive change, instead of just being aware of the issue. How about a section in news which is presented in an almanac fashion and has nothing but statistical facts on environmental and social issues showing the actual reality of these issues? (e.g. pollution levels, number of children dying every minute, amount of oil being consumed, casualties of war, gallons of toxic waste spilled, etc.) Why does the mainstream news media too often focus on one or a few *Homo sapiens* dying or being rescued, while millions of other *Homo sapiens* are dying around the world and need rescuing also?

'Saturday Night Live' has been showing the reality of the world through comedy since 1975, along with others which followed later like *'The Daily Show with Jon Stewart'*, *'The Colbert Report'*, and *'The Soup'*, all of which will be sadly missed by a cult following. Their broadcasts will most certainly go down in history for having shown the reality of the world, while also serving as a reminder of how truly absurd, ignorant, and insane some *Homo sapiens* truly were. Newer shows like *'Last Week Tonight with John Oliver'*, *'Full Frontal with Samantha Bee'*, *'The Jim Jefferies Show'* and *'The Joel McHale Show with Joel McHale'* continue this tradition for the few million who tune in to watch.

CHAPTER II.

Homo sapiens Excessive Footprint

World Population

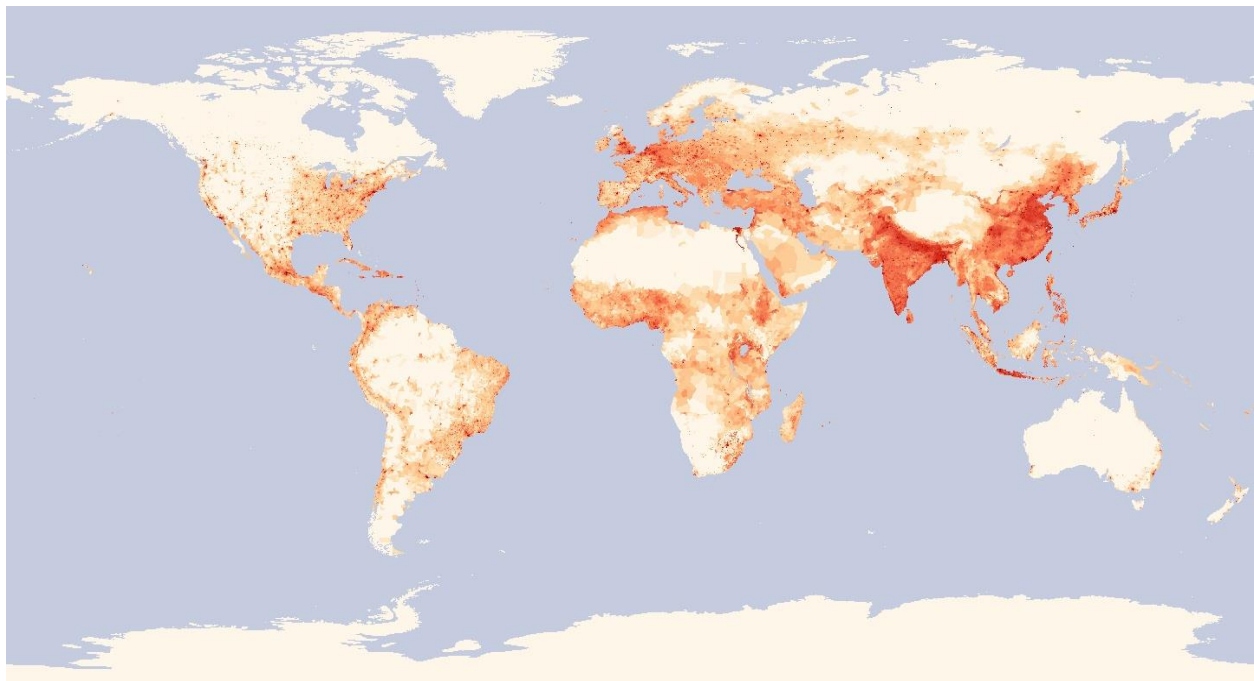
The chemical and advanced scientific revolutions helped to create a rapid population explosion over the last 90 years, and although abortion and contraception are utilized by some around the world, with an estimated 43,800,000 abortions conducted in 2008, the population of *Homo sapiens* continues to grow exponentially. (413) The United Nations estimated the world population of *Homo sapiens* at 7,300,000,000 in July 2015, and they predict a steady decline in the population growth rate in the near future due to the ongoing global demographic transition towards civilization, education, and modernization. If the growth rate declines to zero in the near future the world could have a stable population of around 11,000,000,000. However, underestimated technological and medical advancements in addition to the possible conversion by many to a vegan-based diet could allow for even longer lifespans, and the total future population could be far greater. Future growth in population will also mean increased energy, food, and water consumption resulting in additional environmental stress and impact. Perhaps the more important population issue in the future will not be how many *Homo sapiens* inhabit the planet, but for how long. Already there are *Homo sapiens* which have lived 117 years, so it is not preposterous to think that they could possibly live even longer in the future. How much of a footprint would *Homo sapiens* leave on Earth if the average lifespan were 150 or even 200 years in duration? How much additional food, water, energy, and other resources would this longer living generation consume? Will modern or future *Homo sapiens* perhaps practice more restraint when it comes to procreation?

YEAR	WORLD POPULATION
35,000 BCE	3,000,000
10,000 BCE	15,000,000 (Agricultural Revolution)
1804	1,000,000,000
1927	2,000,000,000 (Chemical Revolution)
1960	3,000,000,000 (Advanced Scientific Revolution)
1974	4,000,000,000
1987	5,000,000,000
1999	6,000,000,000
2015	7,300,000,000
2030	8,500,000,000
2050	9,700,000,000
2100	11,200,000,000
SOURCE: Wikipedia and United Nations (72)	

It should also be noted that of the 7,300,000,000 *Homo sapiens* in the world 1/3 of them reside in only two countries, 1,300,000,000 in China and 1,200,000,000 in India. If these two countries had similar populations like the next most populated nation, the United States with 321,000,000 the world population would be around 5,500,000,000. 3% of the world's population lived in cities in 1800, by 2010, 50% lived in cities, and this number is forecasted to reach 70% by 2050. If this trend continues, less *Homo sapiens* will inhabit the remote ecosystems and this could perhaps help with the conservation of many areas allowing these remote areas to be rehabilitated and in reverting back to more of a wild natural state. Although, another consideration is the fact that many once small communities which only had a few hundred or less inhabitants now have thousands, and the communities which had a few thousand now have tens of thousands or more, so in essence the once small communities are becoming larger modern cities.

The United States had so few indigenous *Homo sapiens* living on its bountiful lands before the conquest of the Americas, as did so many other areas of the world. Then came the European invasion of greed and tyranny which encroached on, depredated, and finally assimilated the indigenous *Homo sapiens*. California is a good example of this difference in that California's current population is 38,000,000 and growing, and before the Europeans invaded and exploited the lands of California there were only 150,000 indigenous encroached that inhabited all of California living in perfect harmony with nature on land which most Europeans erroneously thought was an uninhabitable wasteland. (94)

There have been population declines in history mostly due to famine, war, disease, or natural disaster, but now most of the current deaths in the western civilized world are self-inflicted and preventable, as they mainly result from anthropogenic activities and lifestyle choices. In fact, a 2015 WHO report concluded that fertility rates worldwide are declining which has resulted in world population growth slowing nearly everywhere globally except Africa. (413) Some scientists warn that past evidence combined with statistical probabilities means that an inevitable catastrophic natural disaster at some point in the future will occur. (e.g. extraterrestrial object impact, volcanic activities, etc.) Others think that a virus will ultimately emerge or evolve resulting in a deadly worldwide pandemic. Will these natural checks and balances disrupt the world population growth as they did during the Antonine Plague, Plague of Justinian, Black Death pandemic, and others throughout history? Some think that disease, famine, natural disasters, and the like are just natural checks and balances, and they postulate that if *Homo sapiens* would not attempt to save everyone then the population could be held in check naturally while also strengthening *Homo sapiens* genes and developing more natural resistance. Disease, famine, and natural disasters keep flora and fauna species in check, so why should it be thought that *Homo sapiens* would be treated any different than the other species on Earth? Will civilization itself through political change, education, and modernization stabilize the world population? What would the world be like with 11,000,000,000 *Homo sapiens* or possibly even more? Could the future cities of Earth have a population of 500,000,000 or more, with citizens packed into layers of buildings rising above and descending below the surface of Earth? How much and what kind of nature would be left in a world of this sort? Could the population of Earth be dramatically reduced in the near future to only 100,000,000 *Homo sapiens* or less because of space exploration and colonization?



SOURCE: NASA - World population density in 2000. https://neo.sci.gsfc.nasa.gov/view.php?datasetId=SEDAC_POP

Mass Consumption

'Live simply so others may simply live', is a statement that holds true more so today than of any other time in the past. There are a very small percentage of *Homo sapiens* in the world which currently live a very simple non-impactful minimalist lifestyle upon Earth, utilizing only what they need and recycling everything until it has no more usefulness. This lifestyle can be seen in more past than present cultures around the world, J. Eric S. Thompson mentioned how frugal the Maya are in writing,

"The Maya is frugal-he has to be-but nowhere else in the world have I seen such patched clothes, with one neat patch on another until, without exaggeration, it was almost impossible to identify more than the smallest areas of the original garment." (422)

Whereas Henry David Thoreau describes the exact opposite in Western society in writing,

"Who could wear a patch, or two extra seams only, over the knee? Most behave as if they believed that their prospects for life would be ruined if they should do it. It would be easier for them to hobble to town with a broken leg than with a broken pantaloons. Often if an accident happens to a gentleman's legs, they can be mended; but if a similar accident happens to the legs of his pantaloons, there is no help for it; for he considers, not what is truly respectable, but what is respected."

"...perhaps we are led oftener by the love of novelty and a regard for the opinions of men, in procuring it, than by a true utility." (638)

In today's Western society, consumption is generally regarded as a defining indicator as to how well the society is progressing and doing economically, but it is also an indicator of the depredations *Homo sapiens* have inflicted upon the Earth. Science, technological advancements, and the invention of automated machinery have all contributed to making the production of products easier and the consumption even greater. The vast majority of society have a 'throw away and buy a new one' mentality in regard to consumption and have no conception of moderation, and thus they engage in extreme indulgence. There seems to be no real mass consensus or effort to reuse, recycle, and conserve anything being used, unless it is monetarily advantageous or absolutely necessary. Through narrow-mindedness, unscrupulous behavior, and uneducated decision-making *Homo sapiens* have acted very imprudent towards Earth with their lifestyle choices and habits. Is a high rate of consumption truly a distinguishing characteristic of an advanced society as many think, or is it simply nothing more than greed and indulgence and a clear indicator that society has become decadent? Can the consumption of everything be reduced by *Homo sapiens* simply not indulging and leading a more moderate lifestyle? Ward Chesworth wrote,

"Opulent materialism can only be sustained for the relatively few in society - the king and his court, the tyrant and his favourites, the president and his bagmen. The eighteenth century radical, Tom Paine, believed that the prototype of them all was the thief and his gang. The rest of us aspire to the more modest version of opulence called affluence. The problem is that the most fortunate part of the human population has now attained an affluence that approaches historical opulence. The affluence of a Canadian or American for example, is roughly the equivalent of 10 to 15 inhabitants of the third world, in terms of life-time consumption and waste generation. All 10 to 15 hope to enjoy our level of luxury someday, and indeed the Brundtland report states its goal to be exactly that. If achieved, it would scar the biosphere so badly that the downfall of the civilization we currently enjoy would be assured. Ten thousand years of trial and error, reaching back before Sumer, would simply be another failed experiment. And even if the goal is not achieved, as seems more likely, the stress between the haves and the have-nots would leave little chance for the development of a stable world community." (670)

The idea of a moderate lifestyle can be seen in many ancient cultures, this was the theme during much of ancient Greek culture and especially we can see a moderate lifestyle in the Maya culture. J. Eric S. Thompson wrote,

"As we shall see, Maya character, with its emphasis on moderation, discipline, co-operation, patience, and consideration for others, made possible outstanding achievements in the intellectual field.

Maya philosophy is best summarized in the motto, 'Nothing in excess,' which was inscribed over the temple of Delphi. Harmonious living, moderation, and a full comprehension of that spirit of toleration for the foibles of one's neighbors contained in the expression 'live and let live' characterize the present-day Maya. The development of a somewhat similar philosophy has been considered one of the great achievements of Athenian culture, and rightly has been put before material progress.

Quiet compromise and the spirit of live and let live were too deeply ingrained in his and his neighbors' characters to let him

doubt the result. Everyone, and all the trees, the crops, and the animals had their rights. One must not violate these rights or try to take more than was his due. All such matters should be looked at from the other point of view as well as one's own.

It must be remembered that the Maya did not set the human race so far apart from the rest of created life as we do, but then the Maya had, and still has, a deeper sense of his relative unimportance in creation." (26)

Watching Robert J. Flaherty's 1922 documentary '*Nanook of the North*' one can see exactly how simple the indigenous *Homo sapiens* lifestyle once was and still is for some even today. The Maya had no beasts of burden and no wheel, they used not a single nail in constructing their dwellings, and yet they built great temples and homes in which they lived. There are very few remains from past societies of the last 10,000 years, for the most part there are stone buildings or other artifacts that have weathered nature and time. But over the last 300 years, there has been an increase in not only the amount of garbage, but also the type. To think of all the mass quantities of clothes, shoes, dishes, and other items these ancient societies must have made and utilized, and how little remains on the earth today that was not preserved, usually by chance, this is truly how *Homo sapiens* should leave Earth when they die. *Homo sapiens* of past societies had fewer possessions, all of which were handcrafted out of natural bio-degradable materials and were also made to be more durable lasting the lifetime of the possessor and even to be passed on to their descendants. Possessions today are more based on social status, trend, or indulgence, all of which revolve around the generation of profits from the sale of these items, ultimately creating an endless cycle of pollution, garbage, and waste of resources. The excessive hoarding of things based on unnecessary preparedness, aesthetical obsession, or object idolization all feed into the trillions of dollars' worth of meaningless, worthless, unproductive, and polluting commerce.

What is even more appalling is the amount of food which is purchased and never consumed only to be ultimately discarded and wasted while others around the world are dying of starvation and malnutrition related diseases. The United Nations World Food Programme estimates that **795,000,000 million *Homo sapiens* worldwide go to bed on an empty stomach each night**. Many western societies waste an abundant amount of food, and 1,600,000,000 tonnes of food, or 1/3 of all the food produced worldwide is discarded or goes to waste amounting to \$990,000,000,000. **One-fourth of the food being lost or wasted globally could feed 870,000,000 *Homo sapiens* in the world.** (189) The surplus of food being discarded, from grocery stores and restaurants, is sometimes now being distributed to low income individuals and families through food banks, but food continues to be wasted in so many forms and could be recycled even further. In agricultural operations and in grocery stores, billions of pounds of perfectly edible food is discarded because of the size, a bruise, or other blemish in an effort to make the marketplace more aesthetically appealing and inviting for consumers. Allot of food is purchased and simply left to rot in many Western society kitchen pantries. Much food is discarded simply because consumers have a misconception about an expiration date and a freshness date thinking that the freshness date means the date it must be consumed by, when in actuality it is when the food tastes freshest by and has nothing to do with edibility. Some consumers discard food because of freezer burn thinking that the food is spoiled, but again it is still very edible. Vast amounts of food are wasted because of the large portions served at restaurants with many consumers not taking the leftovers home to consume later or give to a less fortunate individual. Could many of these issues not be corrected by better individual food management habits? Could not all soon to expire food be given to a food bank or directly to individuals by placing an ad on Craigslist free section or on social media, instead of discarding it into the trash? How much money could households save if they had more access to all the perfectly edible food being discarded? How many millions of pumpkins are carved every year for Halloween and not consumed? Why don't consumers instead make a pie or other pumpkin based dish? How many millions of chicken eggs are boiled and dyed each year during Easter and never consumed? How much food is wasted making an offering during a religious ceremony? How much food is not simply washed and instead is discarded when it touches the floor or another undesired surface? How much food could be saved through better eating habits? (e.g. not discarding leftovers, or using a kitchen utensil to scrape the sides of a food container, or adding a small amount of water to a partially sealed food container to get the tad of food stuck to the sides of the container)

Carl Haub estimates that 107,602,707,791 births have occurred since the dawn of modern *Homo sapiens* around 52,000 years ago (700), yet most of the environmental damage has been done mainly during the last 200 years by only 15,000,000,000 or so of the total number of *Homo sapiens* to have ever inhabited the Earth. The lifestyle

the inhabitants of a planet and the materials which are chosen to create things, makes the difference in leaving barely a footprint or any sign one ever inhabited the planet like a few pottery sherds, maybe a wall of an adobe house, or a painting on a cave wall, versus leaving a footprint of synthetically made unnatural non-biodegradable things that will take thousands to perhaps millions of years to decompose. That isn't to say that the *Homo sapiens* which have inhabited Earth throughout all eras of history haven't done some damage to the Earth in their own way, slashing and burning forest for agriculture, cutting down forests to build cities and ships, draining swamps for agriculture, overkill of species, etc. But the scale at which it has occurred in modern times is infinitely vaster with the help of science and technology, and these tools and chemicals with which to depredate the Earth have only continued to increase in severity over time. Paleontologists and anthropologists have speculated that *Homo sapiens* have been causing mass extinctions for 50,000 or more years. Evidence is emerging which shows a strong correlation with the arrival of *Homo sapiens* in North and South America, Australia, and other areas of the world and the extinction of megafauna species. Richard Leakey and Roger Lewin state that,

"Nevertheless, in recent years it has become undeniable that the evolution of *Homo sapiens* was to imprint a ruinous signature on the rest of the natural world, perhaps right from the beginning...

The message of the complexity of ecosystems-their interconnectedness and their vulnerability to disruption by human hands-repeats again and again...

The coincidence of this mass dying with the end of the glacial epoch is precise, and would seem compelling as a putative causal agent. Yet there are few detailed hypotheses about exactly how the extinction might have occurred. It is not sufficient to say that plant communities were plunged into disarray; *therefore* animal species became extinct. This was one of the reasons why, in 1967, Paul Martin, a paleontologist at the University of Arizona, revived the overkill hypothesis of Wallace and Owen, and termed the phenomenon "Pleistocene overkill." He argued that climatic change was not the only event with which the end-Pleistocene extinction coincided. At the same time, a new kind of mammalian species was spreading through the Americas, beginning about 11,500 years ago in the north (after having crossed the exposed Bering land bridge from Asia), and continuing for a millennium, reaching Tierra del Fuego, at the southern tip of South America, 10,500 years ago. The immigrants to the New World are known to archaeologists as Clovis people, named after their delicately crafted projectile points...

Martin calculates that within 350 years of entering North America, the original bands of Clovis people had increased their numbers to 600,000 and had reached the Gulf of Mexico. This explosive expansion was facilitated by unlimited resources-land and prey-opening up before their inexorable advance. Before their first millennium in the New World was over, the Clovis people had reached the southern tip of the continent, and now numbered many million. This north-to-south population expansion left a trail of destruction, as hunters were easily able to kill large, lumbering prey unused to a new kind of predator. The animals probably had no innate fear of humans, as is often the case in regions of the world (usually islands) that have evolved in the absence of humans; they would therefore have been particularly vulnerable to efficient hunters. The hunters, in their turn, were unused to this kind of prey, and so were perhaps freed from the usual hunters' constraint against mass killing." (123)

There is a prevalent theme of moderation, coexistence, and respect for Earth in most indigenous societies throughout the world, be it North America, South American, Africa, or other parts of the world. Could these morals have originated, because of oral stories passed down throughout the generations about this overkill and extinction thousands of years ago? Could they have learned from their ancestor's depredations, about over-exploitation, and the over-killing of faunae, and this was one of the reasons for their nearly perfect symbiotic relationship and coexistence with the natural world around them when the Europeans arrived? Is history repeating itself and modern-day *Homo sapiens* are experiencing a similar lesson? Will they learn from this lesson or will it simply be ignored? Can future generations be different through education and shown by example how to live a better more natural alternative lifestyle with a smaller footprint as their ancient ancestors did? How much less consumption would there be if *Homo sapiens* just lived more simply and had minimalism lifestyles with less material possessions? Will future generations perhaps be more self-sufficient like their ancestors growing fruits and vegetables and making their own clothes and other household items? What if *Homo sapiens* shared more items with their fellow *Homo sapiens*, or if more products could be rented, wouldn't this reduce consumption if there were less items which had to be purchased per individual, especially for products which are only used occasionally or once in a lifetime?

How Much Consumption is Too Much?

The billions of plastic items that are being consumed daily and which have been consumed over just the last 100 years is extensive. Most products today have more packaging than product to aid in marketing or for manufacturing convenience, and this packaging usually lasts far longer than the product being consumed. (e.g. most food packaging is synthetic plastic and only stores the food for a few weeks or days while the packaging is around for hundreds or thousands of years afterwards) All of the waste, consumption of resources, and product packaging for food alone immense. What if grocery stores sold more food items via bulk merchandising and consumers brought their own containers to dispense the desired amount of food into? This may not be feasible for all food products, but it could be used for a variety of foods, and this system is already being used in some grocery stores for food items like granola, nuts, candy, etc., so certainly many more food items could be sold in this fashion. Many products are made in abundance and consumed in the same manner, some products are sold only via bulk-packaging to either market them better to consumers as being a better value or to make manufacturing costs lower, but this method can also result in even more consumption of the product. Millions of novelty and trend-based products are marketed and sold to gullible consumers each year who hoard thousands of useless collectables throughout their lifetime, only to have them discarded in a landfill when they die. Many items which are disposed of still have use left in the product. (e.g. toothpaste has several more servings of toothpaste in the container, it can easily be accessed by cutting the container open with scissors)

A good example of the amount of consumption and waste of products can be illustrated in the simple exercise of looking at a product around you, pick anything, lip balm for instance. Now imagine that one company and how many tubes of lip balm they have created since their inception, 1,000,000 or 10,000,000 or perhaps more. Also factor in that this consumption has been increasing and going on for over 75 years so that would make 75,000,000 or perhaps 750,000,000 used plastic lip balm tubes that were made and disposed of throughout the history of the product thus far and counting. Then think of all the empty useless lip balm tubes that now occupy space in a landfill and the toxic chemicals which are going into the soils of Earth or if the tubes were incinerated the toxic chemicals went into the atmosphere. Now do that exercise for automobile tires, plastic water bottles, batteries, computers, cellphones, automobiles, toothbrushes, disposable razors, or any of the other millions of products which are produced in vast quantities, the list is nearly infinite. Also, don't forget to factor in the many tiny plastic parts and other things which make up the larger product as a whole, the gaskets, casings, stickers, glue, paint, lubricants, safety seals, etc.

Technology is always advancing, and electronic manufacturers now offer a wide variety of product choices, many of which are cheaply manufactured products with an infinitesimal lifespan. Since their invention, how many of the billions of laptops, printers, desktop PCs with monitors, smartphones, and tablets which were sold are now sitting in a landfill? How many billions of printer ink cartridges have been manufactured and sold over that same time? Prescription medicine bottles are never reused by pharmacies refilling prescriptions, how many millions of these bottles are thrown away each month? How many billions of unwanted and unused ketchup, mustard, relish, hot sauce, salt, pepper, lemon juice, sugar, artificial sweetener, honey, and other condiment packets are given away with take-out food meals and drinks, only to be discarded unopened into the trash? How many millions of straws, stirrers, lids, silverware, and other plastic items are also given out unnecessarily? How many billions of product safety seals are used because of nothing more than paranoia? Washable and reusable cotton diapers have been used for thousands of years until their recent replacement by the disposable plastic diapers. How many trillions of plastic diapers have been used and now sit in a landfill or pollute an ecosystem? How many millions of plastic tampons are discarded every month? How many millions of plastic ribbons and silicone wristbands for charity or cause awareness have been made? Would not conversing about a charity or cause also bring about awareness and attention perhaps even more so than a color symbol which most are unable to decipher? How many billions of one use or convenience items have been consumed? How many billions of products have been made that are simply a fad and will only be looked at or used for a short period of time, perhaps only once and then thrown away? (e.g. party, holiday, festival, sporting event, items like plastic cups, hats, glasses, or other things) How many billions of lime desiccant or other oxygen absorbers are added to products in an attempt to maintain a longer shelf life? How many road flares are used each year when a simple flashing led light could be used instead? How many billions of toxic one-use items like glow sticks have been

consumed? How many billions of instruction manuals are senselessly printed in 5 or more irrelevant languages adding unnecessary paper in order to make manufacturing or distribution easier? How many billions of vinyl records, 8-track tapes, cassette tapes, CDs, and DVDs were consumed until their near replacement with MP3s and other online digital media sources? How many millions of headphones, pillows, bars of soap, mini shampoo and conditioner bottles, and other plastic items distributed by airlines, hotels, and cruise ships and then discarded unused or after only being temporary used?

Why are so many billions of plastic disposable items made without any recycling options? Shouldn't any product which will be manufactured in such large quantities, say more than 50,000 times, be required by law to have recycling program in place for that product? How much paper is wasted with unwanted and unnecessary receipts? How much paper could be saved, if instead of automatically printing and giving a receipt to ever customer cashiers asked the customer if they even wanted a receipt? Don't credit card transactions in essence make paper receipts obsolete as there is a permanent electronic record of the purchase? How many billions of led lights consume needless power while on standby, powered off, or charging? Why aren't automatic on/off energy saving systems on new homes mandatory by law? Why aren't water flow control devices for water conservation mandatory by law also? How many billions of tires have been used since the car was invented more than 100 years ago, and were either disposed of through incineration contaminating the atmosphere, or now occupy space in a landfill? How many fragments of tires, brakes, and other automobile parts now pollute the ecosystems of Earth? How many thousands of helium filled balloons are let go everyday during events or by children and float off into the atmosphere to only later come down and kill faunae or pollute an ecosystem? How many minute particles of synthetic plastic flake off of the billions of pairs of shoes every day and end up polluting the water or soil? How many trillions of cheaply made plastic toys are consumed every year to only end up in a landfill within that same year? How many billions of air cushions, pieces of bubble wrap, polystyrene foam peanuts, and other plastic padding is over used each year shipping products to customers and then discarded? How much toxic antifreeze leaks out of automobiles only to pollute the soil or water? How many billions of gallons of toxic paint and varnish have been used for aesthetics, only to flake off and contaminate the soil and water? How many millions of perfectly habitable buildings have been demolished throughout history simply to build a more elaborate structure? How many millions of gallons of toxic tree paint has been applied to trees after pruning to bandage a wound caused by the pruning itself or to prevent cracking of new bark? How many billions of toxic mothballs made of naphthalene or 1,4-dichlorobenzene have been used? Why would anyone put a toxic pesticide with their clothes which could then be absorbed through their skin? Is there a real threat to clothes from insects which are sealed in a house or closet, or is this simply a custom which continues to perpetuate because of ignorance? Would not natural camphor be less toxic and perhaps be equally effective?

How much electricity is wasted on senseless lighting to illuminate statues, buildings, or other structures each night? How much energy could be saved if millions of *Homo sapiens* participated in a monthly Earth Hour type event turning off all lights and electronic devices? What would happen to carbon dioxide pollution output levels if every automobile driver didn't drive their personal automobile, and instead used public transportation or utilized a ride-share opportunity with a friend or co-worker, for one entire day or even for one whole week each month? How much power could be saved if more lights were energy efficient LEDs? How much energy could be saved if more individual electronic products had built in solar chargers? How much energy could be saved if all grocery stores used closed refrigeration systems instead of the doorless refrigeration units, which most grocery stores have only to make food more accessible and marketable to consumers?

There is also much waste that could be stopped by simply modifying some of the practices that many industries engage in, like senseless labels on products and product packaging which is often excessive brand names, company logos, or pointless instructions and warnings which should be common sense. Many labels are stamped or painted onto products which easily wear off after a few uses, flaking off into the environment or they are possibly absorbed through the skin of the consumer. How much ink is wasted each year printing a company or organizations name on products for nothing more than advertising? How many stickers are used each year to advertise product features? There is also an abundance of waste throughout the world from things like items which have no purpose other than convenience like the stickers on fruit in grocery stores. Can there not just be a sign with the fruit name and price, and the cashiers would know what the fruit is or have a paper identification

table for reference? Or can cashiers not simply be trained to identify fruits and vegetables? Or a cash register system which has the ability to scan the fruit and determine what it is?

A Surplus of Senseless Waste

In 2015, in the United States alone, there were 37,716 grocery stores offering an average of 42,214 separate products. These are the larger stores which have \$2,000,000 or more in annual sales and it does not include the thousands of other smaller grocery stores. (49) In the United States, there are 428 Wal-Mart Discount Stores each offering 120,000 separate products, in addition there are 3,499 Wal-Mart Supercenters each offering 142,000 separate products. Globally Wal-Mart Supercenters include an additional 321 in Canada, 385 in China, 256 in Mexico, and 338 in the United Kingdom. In addition, there are international warehouse clubs like Costco with 727 warehouses and Walmart's subsidiary Sam's Club with 820 warehouses, which offer around 4,000 products with many sold as bulk-packaged goods, thus allowing for even easier mass consumption with a discounted monetary rate. Worldwide, there are hundreds of thousands of variety stores where most products cost \$1.00 or less and is usually cheaply made junk made from synthetic plastic which ends up in a landfill soon after being purchased. In the United States, there are 12,483 Dollar General stores and 13,600 Dollar Tree stores. There are 750 Hobby Lobby stores and 1,367 Michaels Stores Inc. containing millions of cheaply made synthetic plastic products for home decor, arts and crafts, and senseless hobbies. In 2014, Amazon sold a total of 5,000,000,000 items. (181) Many of the products that all of these stores offer are nothing more than the same thing packaged and priced differently, in fact many of the brands are owned by just a few companies. How many billions of useless, pointless, or redundant products exist only to generate more profits? How many thousands of new products are created each day?

Consumers in western societies have so much stuff they accumulate, never use, and will never use in their lifetime. So many perishable products are purchased with the intent to use only to be stored and eventually expire leaving it useless. Look around you right now in your home and ask yourself, "Has that product ever been used? Is it superfluous? Will that product ever be used again? Could someone else less fortunate be using it instead?" Why doesn't this clearly visible mass accumulation of products awaken those out of their slumber of indulgence? This addiction to consumption and the erroneous notion that the products are needed could be defined as a mental illness. Many consumers are addicts, and product consumption is like all addictions in that it is the temporary pleasure itself and pseudo sense of satisfaction and security which perpetuates the addiction. The only difference, is that in this case it doesn't result in the destruction of the user, it results in the destruction of the Earth, in essence *Homo sapiens* are addicted to the consumption of Earth itself. Al Gore wrote,

"The cleavage in the modern world between mind and body, man and nature, has created a new kind of addiction: I believe that our civilization is, in effect, addicted to the consumption of the earth itself. This addictive relationship distracts us from the pain of what we have lost: a direct experience of our connection to the vividness, vibrancy, and aliveness of the rest of the natural world. The froth and frenzy of industrial civilization mask our deep loneliness for that communion with the world that can lift our spirits and fill our senses with the richness and immediacy of life itself."

"...huge quantities of pollution, products for which we spend billions on advertising to convince ourselves we want, massive surpluses of products that depress prices while the products themselves go to waste, and diversions and distractions of every kind. We seem increasingly eager to lose ourselves in the forms of culture, society, technology, the media, and the rituals of production and consumption, but the price we pay is the loss of our spiritual lives."

"Our industrial civilization makes us a similar promise: the pursuit of happiness and comfort is paramount, and the consumption of an endless stream of shiny new products is encouraged as the best way to succeed in that pursuit. The glittering promise of easy fulfillment is so seductive that we become willing, even relieved, to forget what we really feel and abandon the search for authentic purpose and meaning in our lives."

"Many people seem to be largely oblivious of this collision and the addictive nature of our unhealthy relationship to the earth. But education is a cure for those who lack knowledge; much more worrisome are those who will not acknowledge these destructive patterns. Indeed, many political, business, and intellectual leaders deny the existence of any such patterns in aggressive and dismissive tones. They serve as "enablers," removing inconvenient obstacles and helping to ensure that the addictive behavior continues."

"What I have called our addictive pattern of behavior is only part of the story, however, because it cannot explain the full complexity and ferocity of our assault on the earth. Nor does it explain how so many thinking and caring people can

unwittingly cooperate in doing such enormous damage to the global environment and how they can continue to live by the same set of false assumptions about what their civilization is actually doing and why. Clearly, the problem involves more than the way each of us as an individual relates to the earth. It involves something that has gone terribly wrong in the way we collectively determine our mutual relationship to the earth.” (277)

Homo sapiens endless consumption of not only trend-based products, but of products which have an infinitesimal lifespan or period of use before the item is buried in a landfill, has led to more manufacturing and an endless growing cycle of consumption, waste, and pollution. If the 'throw away buy a new one' attitude changes, will society stop consuming so much, and will this change also be done at the manufacturing level by making things more durable which last longer and of natural materials which can be recycled and are also bio-degradable? If consumers would purchase more natural and permanent onetime products for tasks that will be done throughout their entire life, (e.g. glass jar instead of plastic container, wooden box instead of a plastic box) this would also lead to less consumption of everyday items, which are often designed and manufactured for one-time use so the consumer will purchase more, thus spending more money. In regard to the consumption of trend-based products this change is dependent on the consumer, but given *Homo sapiens* history over the last 10,000 years there will be trends in the near future and the majority of consumers will most likely continue to demand the latest and greatest, again one enters into morals and lifestyle changes on the individual level to limit this type of consumption. To consume unneeded things simply for convenience, self-gratification, or to simply allow something useful to go unused are true examples of indulgence and waste. The following table lists the dollar amounts of products sold and not actual product numbers, as these are virtually non-existent or only known by the companies selling the products, but it still gives an idea as to the number of products consumed if one takes the total sales and then divides it by the average price of the product. (e.g. an average package a batteries costs \$4.00 and sales were \$1,067,182,489 which would mean that an estimated 266,795,622 packages of batteries were sold)

Some Products Being Consumed in Mass Quantities in the United States Based on Sales Figures 2013-2014	
Product	Sales
Baby Food	\$1,019,947,135
Batteries	\$1,067,182,489
Beer Domestic and Imported	\$10,832,835,734
Bottled Water	\$4,113,330,527
Cat Food (Dry only, not including canned food or treats)	\$1,090,912,051
Cereal (Ready to eat or cold cereals, not including hot cereals)	\$5,997,867,099
Chocolate Candy	\$2,551,642,838
Coffee Regular and Decaffeinated	\$2,821,275,746
Cookies	\$4,607,401,493
Dog Food (Dry only, not including canned food or treats)	\$2,081,118,963
Frozen Pizza	\$3,007,865,763
Ice Cream	\$4,001,207,434
Potato Chips	\$3,866,495,143
Salad dressing	\$1,352,531,559
Soft Drinks Regular and Low-calorie	\$12,178,400,251
SOURCE: The World Almanac and Book of Facts 2015 ISBN-13: 978-1-60057-190-9 p.78	

Many *Homo sapiens* from all income brackets shop at thrift stores buying used items, and this type of recycling is more important in today's world than ever, because of all the excess products *Homo sapiens* have accumulated and continue to accumulate throughout their lifetime and remain long after they are dead. Think of all the products *Homo sapiens* have accumulated by the time they die, and if no one inherits it family wise it all either goes into the trash or is resold. If *Homo sapiens* attempted to acquire most products via second hand this would

have a major impact on recycling efforts like never before and most certainly lead to less manufacturing. It is a simple matter the products being easily available on the internet to a worldwide market and consumers choosing to buy something used or new. When purchasing a product based on a monetary amount, most likely only a minority of worldwide consumers would choose the new product. If consumers who are choosing new products based on a biased and illogical fear of used products can overcome this hurdle, it would help in reducing new product consumption even further.

Most of the wealthy elite in the world squander their wealth on overpriced materialistic products and services. (e.g. \$500 shoes, \$100,000 jewelry, \$51,500 jacket, \$400 salon visit, \$300 meal at a restaurant, \$500 spa treatment, \$100 dog grooming, etc.) The enormous scale of the squandering in the United States is evident in the fact that 70% of wealthy families lose their wealth by the second generation, and 90% lose it by the third generation. (348) How can someone squander such an excessive amount of money on useless materialism while being surrounded by billions of others who are so less fortunate? How can businesses charge so much for something which in reality is worth so little? Life is not about material possessions, it is about other things far more valuable which cannot be bought, but only discovered. Albert Einstein wrote,

"The ideals which have lighted my way, and time after time have given me new courage to face life cheerfully, have been Kindness, Beauty, and Truth. Without the sense of kinship with men of like mind, without the occupation with the objective world, the eternally unattainable in the field of art and scientific endeavors, life would have seemed to me empty. The trite objects of human efforts—possessions, outward success, luxury—have always seemed to me contemptible." (50)

A similar point made about luxury was made by Henry David Thoreau nearly 100 years before when he wrote,

"Most of the luxuries, and many of the so-called comforts of life, are not only not indispensable, but positive hindrances to the elevation of mankind. With respect to luxuries and comforts, the wisest have ever lived a more simple and meagre life than the poor. The ancient philosophers, Chinese, Hindoo, Persian, and Greek, were a class than which none has been poorer in outward riches, none so rich in inward. We know not much about them. It is remarkable that we know so much of them as we do. The same is true of the more modern reformers and benefactors of their race. None can be an impartial or wise observer of human life but from the vantage ground of what we should call voluntary poverty." (639)

Some *Homo sapiens* build enormous and excessive housing structures using vast amounts of labor and materials with the intention of it being some sort of legacy. They ignore the fact, that not only are they here for such a short period of time to even enjoy the structure, but that it too given time will crumble like every other materialist thing on this Earth. Nothing lasts forever, and yet *Homo sapiens* attempt to make all things last forever or longer than they naturally should by putting synthetic chemicals on things, but these futile attempts do nothing more than create more pollution and waste. (e.g. putting varnish on wood or other toxic synthetic chemical coatings on products) Many *Homo sapiens* get so involved with materialism and social standing, that they often miss out on an entire lifetime of reality. This unfortunate myopic focus on materialism and nothing else, is perhaps even more prevalent today with technology, the abundance of products, and a society which too often encourages this behavior. Henry David Thoreau wrote,

"Shams and delusions are esteemed for soundest truths, while reality is fabulous. If men would steadily observe realities only, and not allow themselves to be deluded, life, to compare it with such things as we know, would be like a fairy tale and the Arabian Nights' Entertainments. If we respected only what is inevitable and has a right to be, music and poetry would resound along the streets. When we are unhurried and wise, we perceive that only great and worthy things have any permanent and absolute existence, that petty fears and petty pleasures are but the shadow of the reality. This is always exhilarating and sublime. By closing the eyes and slumbering, and consenting to be deceived by shows, men establish and confirm their daily life of routine and habit everywhere, which still is built on purely illusory foundations. Children, who playlife, discern its true law and relations more clearly than men, who fail to live it worthily, but who think that they are wiser by experience, that is, by failure." (647)

Many actions are done for profit, entertainment, or comfort, and sometimes with the full knowledge of the negative consequences, but often times they are simply done out of ignorance as this is the path which has been set for them by others. The short-term goals of *Homo sapiens* appear to outweigh the unknown long-term goal of an Earth that is natural and untouched by *Homo sapiens*. Society could be described as passive, demoralized, and engulfed within civilization and all the artificially created things which formulate it, blinded to the negative consequences of their actions, searching for something that isn't lost. If *Homo sapiens* become less passive

towards what they are being force fed and regain their moral ground, will corporations then be forced towards change? Based on recent consumer demand for more natural organic products, corporations have had no choice but to offer these types of products. Will corporations continue to get more organic and natural by the acquisition of smaller mom and pop organic natural companies? Will this be the path to making all consumer products more organic, natural, biodegradable, and manufactured environmentally friendly?

Holidays

Since 1851, Americans have been harvesting Christmas trees in the United States, and originally all trees were taken directly from the forests. In 2000, more than 33,000,000 Christmas trees were produced in North America, and more than 50,000,000 Christmas trees were produced in Europe. (304) How much fertilizer, pesticides, water, transportation resources, and other valuable resources are wasted each year as a result of Christmas tree consumption? Why are they called live Christmas trees, when they are in fact dead or dying Christmas trees? An estimated 50,000,000 U.S. households own an artificial Christmas tree, of which about 20,000,000 are so old that they contain older PVC made with lead potentially exposing families every Christmas holiday. (305) How much wrapping paper, tape, ribbon, tinsel, etc. are used once and then discarded every year for birthdays, Christmas, and other holidays? Can't a gift be given without repackaging it? How much electricity is used for the billions of Christmas and other holiday lights? How many millions of Christmas, Halloween, Easter, and other holiday decorations overwhelm society each year? How much silly string, confetti, and other plastic decorations are used once and then discarded during these holidays? How many millions of pieces of unhealthy candy are children and even adults inundated with during Christmas, Halloween, Easter, and Valentine's Day? How many millions of Halloween costumes are worn once and then discarded? Most of these Western created holidays are based on a lie and the generation of profits through consumption. Is it not time that society stop lying to children about Santa Claus, the Easter bunny, Halloween monsters, the tooth fairy, and other mythical wise tales, which only fill their heads with fantasy and expectations, ultimately ending in disappointment a few years later? Is it not time to abandon these holiday traditions which are based mainly around money and consumption? Is not the true meaning of many holidays the celebration of love and happiness? Can family and friends not come together a few days out of the year, and share a delicious meal and reminisce, perhaps giving a small gift which is from the heart and not based on wants and needs? How many billions of candles are wasted each year in churches and for other ceremonious occasions? How many thousands of bonfires around the world are lit every year during Lag BaOmer, burning man, and other ritualistic gatherings, wasting resources and polluting the atmosphere? All for the worshiping of a mythological God and/or because of tradition. What would the world be like if more *Homo sapiens* celebrated and devoted as much time and money to Arbor Day and Earth Day, as they do for other mainstream holidays like Christmas, Easter, Valentine's Day, Thanksgiving, New Years, etc.? How much less consumption would there be around the holidays if more consumers celebrated Buy Nothing Day instead of Black Friday?

Each year, for New Years, Independence Day, and other celebrations, thousands of large scale firework displays explode millions of fireworks in cities throughout the world. Everyday worldwide, millions of small scale fireworks are exploded at weddings, parties, festivals, and by firework enthusiasts. During the summer in Japan, hundreds of fireworks festivals are held, some setting off more than 100,000 fireworks during one fireworks display. The Walt Disney World Resort has the Wishes Nighttime Spectacular show nearly every night which usually has a fireworks display. Some cities around the world like in San Cristobal de las Casas, Mexico engage in fireworks displays almost daily. Fireworks contain many toxic chemical elements like aluminum, antimony, barium, carbon, calcium, chlorine, cesium, copper, iron, lithium, magnesium, potassium, phosphorus, radium, rubidium, sodium, sulfur, strontium, titanium, and zinc which can be dispersed into the atmosphere, soil, or water when the firework explodes. As many fireworks displays take place over urban areas, most of these chemicals rain down onto the buildings and city streets to be washed away during the next rain, entering the soils and water. These explosions not only pollute the Earth, but also displace and disrupt fauna from stress. Research done between 1999 and 2013 by NOAA, found that concentrations of fine particulate matter were 42% higher than on the days preceding and following the 4th of July holiday. At one air quality monitoring station where fireworks were set off in an adjacent field particulate matter concentration rose 370%. (403) On New Year's Eve in 2010, fireworks in Arkansas scared roosting red-winged blackbirds forcing them to take flight, because they

are poor night fliers they crashed into homes and cars, and more than 3,000 birds died from blunt-force trauma. (289) Why are fireworks not regulated by the EPA, are they not an environmental pollutant? Why have so few studies been done about the effects of fireworks on wildlife and the environment? How many spectators inhale this fine toxic particulate matter, perhaps causing future respiratory or other health issues? How many flora and fauna are injured or killed each year as a result of ground and aerial based fireworks? Is the environmental damage worth an aesthetically pleasing light show that many are often too inebriated to even remember?

Excessive Use of Anti-Bacterial Agents

Homo sapiens daily use of synthetic toxic chemicals in things like dish soap, hair care products, laundry detergents, household cleaners, etc., has led to severe stress throughout the ecosystems of the world. All of these synthetic chemicals are used in vast quantities and end up polluting the air, water, and soil during the manufacturing process, the consumption phase, and ultimately the waste phase. This over emphasis on sanitation was created and is perpetuated by a billion-dollar chemical cleaning industry which markets synthetically made sanitation chemicals that are toxic to all living organisms. Mass production and consumption of sprays, powders, and heavily concentrated liquid cleaners that use a wide range of toxic chemicals has been occurring now for more than 75 years. How many millions of gallons of these toxic agents of death get used every day? How many billions of gallons have polluted Earth since their discovery over 75 years ago?

Jessica Metcalf from the University of Colorado at Boulder has studied fossilized feces from *Homo sapiens* as far back as 1,000 years and has discovered that they contain far more diverse gut bacteria. Another study, which examined the gut microbial communities of the Hadza of western Tanzania, found that some dynamic lineages of microbes have become less prevalent and abundant in some modernized populations. (530) These helpful protective bacteria have been lost, most likely due to intensive hygiene practices, dietary changes, antibiotics, and spending less time outdoors. Bacteria existed billions of years before *Homo sapiens* inhabited Earth, in fact trillions of bacteria and other microbes live on and inside *Homo sapiens* creating an ecosystem in essence. These bacteria help in many ways from the immune system to the digestive tract. Isolation and separation from nature could lead to future medical issue by not allowing for the development of natural immunity. Attempting to kill bacteria seem to have only made them stronger and more resistant to chemicals and drugs, while also making them even more deadly. *Homo sapiens* have a natural immunity to many germs and the immune system can actually weaken overtime with less exposure to natural occurring bacteria. So why then do so many *Homo sapiens* have an extreme fear of all bacteria and think that they must be eradicated because they are a sign of germs and filth that will cause disease?

By attempting to isolate nature and *Homo sapiens* pseudo perfected world from each other, all *Homo sapiens* have done is pollute the Earth with unnecessary and unnatural chemicals in their attempt to sterilize everything. Ultimately, having no real impact on the bacteria as it has adapted and become stronger, evolving faster than *Homo sapiens* futile attempts to eradicate it. Germaphobes and perfectionists certainly have made a negative impact on the environment, usually with unwarranted fear while striving for an unattainable goal to create a germ and dirt-free area by utilizing toxic chemicals, which in fact do more harm than good, especially when used in such vast and frequent quantities. This mentality has led to consuming mass quantities of disinfectant sprays, anti-bacterial soaps, hand sanitizers, and wipes in a futile attempt to sanitize everything. In most instances this disinfection is unneeded, overused, and could easily be replaced by a natural Eco-friendly alternative when needed. Natural bio-degradable alternatives like simple hot water, vinegar, baking soda, citrus, or other flora-based cleansing solutions can be used just as effectively.

Another consumer cleaning consumption concern are the scrubbers, mops, and other cleaning tools, all of which are made of synthetic plastics and when used flake off millions of microscopic plastic particle fragments that ultimately end up in the water and soil. In addition, many dishes are made from plastic, Teflon, or another synthetic chemical, and when cleaned microscopic particle fragments also flake off directly from the dishes and other kitchenware. How much of a negative impact on Earth are all these chemicals and microscopic fragments of plastic having? Could this antibacterial paranoia breed even more deadly bacteria resistant to even the most powerful known anti-bacterial agents? How can all of these chemicals going into sewage sludge for possible

agricultural fertilizer, or directly into the soil and water of Earth be acceptable? Could dependence on these products result in *Homo sapiens* natural immune system becoming less effective? Have *Homo sapiens* only created more problems with their attempted sanitization solutions? Would one need so many antibacterial and degreaser agents to clean dishes if they did not consume fatty fauna-based foods? How much excessive soap is applied out of habit, when none is even necessary as hot water would work sufficiently (e.g. rinsing simple non-sticking foods like bread crumbs off a plate)?

Sunscreen, Tanning, Cosmetics, and Tattoos

A variety of toxic ingredients like, p-Aminobenzoic acid, phenylbenzimidazole sulfonic acid, benzophenone-3, and titanium dioxide are used to make most sunscreens. A study which sampled the U.S. general population ≥ 6 years of age found that 96.8% of participants had benzophenone-3 in their urine sample. (420) Chemicals used in sunscreen have also been found to awaken dormant coral viruses causing the coral to become sick and often die. An estimated 4,000 to 6,600 tons of sunscreen are washed off in oceans, lakes, and rivers polluting these aquatic ecosystems and can also kill the flora and fauna which inhabit them. (418) A 2014 report conducted by researchers in Spain on sunscreen as a source of hydrogen peroxide production stated,

“Sunscreens have been shown to give the most effective protection for human skin from ultraviolet (UV) radiation. Chemicals from sunscreens (i.e., UV filters) accumulate in the sea and have toxic effects on marine organisms. In this report, we demonstrate that photoexcitation of inorganic UV filters (i.e., TiO_2 and ZnO nanoparticles) under solar radiation produces significant amounts of hydrogen peroxide (H_2O_2), a strong oxidizing agent that generates high levels of stress on marine phytoplankton. Our results indicate that the inorganic oxide nanoparticle content in 1 g of commercial sunscreen produces rates of H_2O_2 in seawater of up to 463 nM/h, directly affecting the growth of phytoplankton. Conservative estimates for a Mediterranean beach reveal that tourism activities during a summer day may release on the order of 4 kg of TiO_2 nanoparticles to the water and produce an increment in the concentration of H_2O_2 of 270 nM/day. Our results, together with the data provided by tourism records in the Mediterranean, point to TiO_2 nanoparticles as the major oxidizing agent entering coastal waters, with direct ecological consequences on the ecosystem.” (419)

Not only does sunscreen destroy aquatic ecosystems and the biota within these ecosystems, it does not even truly protect the skin, because ultimately the toxic chemicals are washed off, or they are absorbed through the skin potentially causing health issues. Would it not be more logical to stay out of the sunlight during peak exposure hours, or use an umbrella and tan with non-direct sunlight? Is an ever-fading aesthetical tan worth destroying aquatic ecosystems and getting skin cancer? Why aren't eco-friendly ingredients like almond oil, coconut oil, red raspberry seed oil, carrot seed oil, shea butter, or other flora-based ingredients used instead which naturally contain a sun protection factor (SPF)?

Since the late 1970s, some *Homo sapiens* have practiced indoor tanning with tanning beds which emit ultraviolet radiation, and can potentially cause skin cancer, weakening of the immune system, and skin aging. Other *Homo sapiens* practice sunless tanning by utilizing a variety of potentially toxic ingredients like carotenoids, lycopene, beta-carotene, canthaxanthin, dihydroxyacetone, temporary bronzers, SIK-Inhibitors, tyrosine-based products, melanotan peptide hormones, and other melanogenesis stimulants. There are also some in Asia, Africa and the Middle East with dark skin pigmentation who reduce the content of melanin of their skin by utilizing a concoction of potentially toxic chemicals, either internally in the form of prescription medication, or externally in the form of a skin cream. Is the aesthetical appearance of having light or dark skin worth the possible negative medical side-effects and environmental impacts? Does changing skin color really make you a different race or ethnicity? If a Caucasian, Asian, African, or Indian alters their skin color, does it change what race or ethnicity they originated from or their true physical characteristics, is this not actually in the deoxyribonucleic acid (DNA)?

Corporations, entertainment, and even some members of society itself promote an image of artificially created beauty, one made up of synthetic toxic chemicals which consist of cosmetics, clothing, diet products, surgery, and other related beauty products and services. Consumers are made to think they can look like the model who is used to market the products or services through advertisements, and most will never achieve this impossible unrealistic image which is based mainly around narcissism and profits. Why can't *Homo sapiens* simply be themselves as they are when they are born without additions and modifications? Are not all *Homo sapiens*

naturally beautiful, even with all their so called physical flaws, and more especially without all the artificial additions? Why does society say to be what you want and not what you are, shouldn't one be encouraged to want to be who they really are and the way nature made them, and not the way someone else tries to make them, which is often based on what is currently trending or deemed acceptable? For thousands of years florae and even the Earth itself was used to create cosmetics, today most cosmetics are made of toxic synthetic chemicals. How much nail polish, perfume, make-up, hair dye, hairspray, hair gel, and other cosmetics made with toxic chemicals are used daily only to wash off and pollute the water and soils of Earth?

Millions of *Homo sapiens* have tattoos, and although there are non-metallic less toxic sources available which are also more eco-friendly, most tattoo ink which used is derived from toxic ingredients like mercury, lead, cadmium, nickel, zinc, chromium, cobalt, aluminum, titanium, copper, iron, barium, ferrocyanide and ferricyanide, antimony, arsenic, beryllium, calcium, lithium, selenium, sulfur, para-phenylenediamine, and polymethylmethacrylate. After death these toxic elements are released into the atmosphere or soils of Earth.

Fashion

Fast fashion is the new business model of the fashion industry, and it is about promoting a rapidly changing style for profits and based on how many units can be cheaply made and sold, and not about quality, functionality, and durability. One can watch Andrew Morgan's 2015 documentary *'The True Cost'* for a good perspective on the fast fashion issue. When no longer wanted, much of this fashion is not recycled and is instead discarded into landfills. In the United States alone, about 24,510,000 tons of rubber, leather and textiles were discarded into landfills in 2014. (599) How many billions of pairs of shoes are bought each year and rarely worn? How much fashion is too much? Does one really need so many outfits and other fashion accessories, 50 t-shirts, 30 pairs of socks, or 20 pairs of shoes?

All clothing, footwear, and other fashion accessories were made entirely from durable hemp, bamboo, cotton, linen, or other natural 100% bio-degradable flora fibers, stones, or other natural materials until around 100 years ago. Now most is made with synthetic fibers like polyamide, acrylic, and polyester, while using toxic chemicals for dyes, all of which pollutes the Earth when washed and ultimately when discarded. In the United States, there are 22,000 dry cleaners most of which use toxic chemicals, excessive energy, and water resources. Dry cleaners, individual washing machines, and other methods to wash clothes often produce a toxic sludge containing dyes, microscopic fragments of synthetic fibers, toxic chemicals from detergents, and other residues. Is polluting the Earth with toxic laundry detergents necessary when so many natural flora-based alternatives are available?

Dry Cleaning Methods	
Cleaning Agent	Description
Perchloroethylene (tetrachloroethylene)	Perchloroethylene (tetrachloroethylene) has been in use since the 1940s. Perc is the most common solvent, the "standard" for cleaning performance. It is a most aggressive cleaner. It can cause color bleeding/loss, especially at higher temperatures, and may damage special trims, buttons, and beads on some garments. Better for oil-based stains (which account for about 10% of stains) than more common water-soluble stains (coffee, wine, blood, etc.). Known for leaving a characteristic chemical smell on garments. Nonflammable. Perc is becoming less popular due to its ground contamination problems and potential health effects. Perc, however, was incidentally the first chemical to be classified as a carcinogen by the U.S. Consumer Product Safety Commission.
Hydrocarbon	Hydrocarbon is most like standard dry cleaning but the processes use hydrocarbon solvents such as Exxon-Mobil's DF-2000 or Chevron Phillips' EcoSolv. These petroleum-based solvents are less aggressive than perc and require a longer cleaning cycle. Although combustible, these solvents do not present a high risk of fire or explosion when used properly. Hydrocarbon also contains volatile organic compounds (VOCs) that contribute to smog. Pure Dry is another brand.
Dibutoxymethane	Dibutoxymethane is a product offered by Kreussler. It is sold under the trade name SolvonK4. It is a bipolar solvent that removes water based stains and oil based stains. SolvonK4 is considered to be one of the best replacements solvents for perc as cleaning performance is very similar.
Liquid silicone	Liquid silicone (decamethylcyclopentasiloxane or D5) is gentler on garments than perc and does not

(decamethylcyclopentasiloxane or D5)	cause color loss. It is licensed by GreenEarth Cleaning. Though more environmentally friendly, it is more expensive. Degrades within days in the environment to silicon dioxide and trace amounts of water and CO ₂ . Produces nontoxic, nonhazardous waste. Toxicity tests by Dow Corning shows the solvent to increase the incidence of tumors in female rats (no effects were seen in male rats), but further research concluded that the effects observed in rats are not relevant to humans because the biological pathway that results in tumor formation is unique to rats. (170.6 °F/77 °C flash point).
Brominated solvents n-Propyl bromide (Fabrisolv, DrySolv)	Brominated solvents n-Propyl bromide (Fabrisolv, DrySolv) is a solvent with a higher KB-value than Perc. This allows it to clean faster, but it can damage some synthetic beads and sequins if not used correctly. Health-wise, there are reported risks associated with nPB such as numbness of nerves. The exposure to the solvents in a typical dry cleaner is considered far below the levels required to cause any risk. Environmentally, it is approved by the U.S. EPA as an alternative to hazardous solvents used in the past. It is among the more expensive solvents, but due its faster cleaning, lower temperatures, and quick dry times, it's considered to have the same or lower costs overall for the entire process.
Supercritical CO ₂	Consumer Reports rated this method superior to conventional methods, but the Drycleaning and Laundry Institute commented on its “fairly low cleaning ability” in a 2007 report. Another industry certification group, America’s Best Cleaners, counts CO ₂ cleaners among its members. Machinery is expensive—up to \$90,000 more than a perc machine, making affordability difficult for small businesses. Some cleaners with these machines keep traditional machines on-site for the heavier soiled textiles, but others find plant enzymes to be equally effective and more environmentally sustainable. CO ₂ -cleaned clothing does not off-gas volatile compounds. CO ₂ cleaning is also used for fire- and water-damage restoration due to its effectiveness in removing toxic residues, soot and associated odors of fire. The environmental impact is very low. Carbon dioxide is almost entirely nontoxic, it does not persist in clothing or in the environment, and its greenhouse gas potential is lower than that of many organic solvents.
Glycol ethers (dipropylene glycol tertiary-butyl ether) (Rynex, Solvair, Caled Impress)	Glycol ethers (dipropylene glycol tertiary-butyl ether) (Rynex, Solvair, Caled Impress) is a proposed an environmentally friendly competitor with perc with processing advantaged. However these solvents are generally a blended product and not pure like GreenEarth or SolvonK4.
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

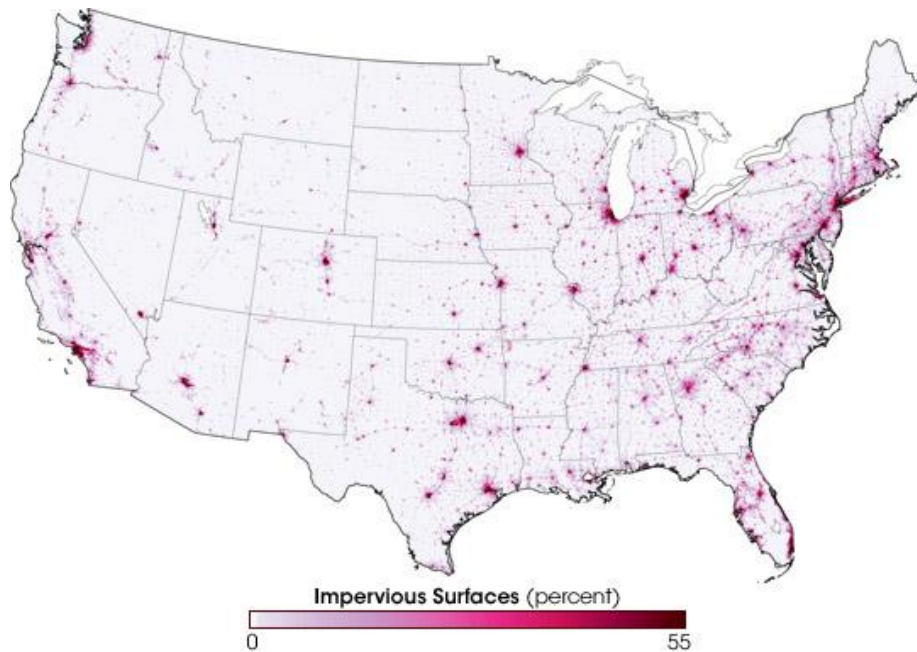
Paint

Until around 150 years ago all paints were 100% natural and biodegradable, but now paints are usually made with a variety of mostly synthetic toxic chemicals like: volatile organic compounds (VOCs), polyesters, alkyds, epoxy, acrylics, vinyl-acrylics, vinyl acetate/ethylene (VAE), polyurethanes, melamine resins, silanes, siloxanes, and other toxic chemicals. In 2015, global paint sales were 37,270,000 tons, or around 8,926,946,108 gallons, which were used for the architectural, industrial, and special purpose coatings markets. (587) How many billions of gallons of toxic paint have been used in the world over the last 150 years? How much lead paint was used when it was the industry standard? How much paint flakes off everyday releasing toxic chemicals into the environment? Why isn’t a more natural and bio-degradable paint used instead? For more than 30,000 years, *Homo sapiens* used stone, mica, glass, and other natural materials to create glitter used in art, cosmetics, and other products. Then, in 1934, synthetic plastic glitter was invented, and although there are now even more methods of creating natural bio-degradable glitter, millions of pounds of synthetic plastic glitter are used each year instead, which ultimately flakes off and pollutes the Earth.

Cities

In most cities there is far less vegetation and natural landscape, so most of the sun’s energy is instead absorbed by buildings and asphalt which leads to higher surface temperatures. How much do these urban heat islands contribute to global warming? How much energy is wasted, and pollution is generated through using more air conditioning because of urban heat islands? How many thousands of residents have died during heat waves as a result of living within an urban heat island? Could not solar panels be designed to replace traditional roof tiles and shingles so that this heat energy could be absorbed and utilized instead? Could not glass windows be replaced with a solar panel type glass to harness even more energy? Could urban heat islands be eliminated entirely by simply planting flora on rooftops, thus reducing surface temperatures while also providing residents with fresh fruits and vegetables? Will more cities continue to greenify areas allowing for more coexistence with

nature?



SOURCE: NASA - Impervious surfaces which include pavement surfaces like roads, sidewalks, driveways, parking lots, airports, ports and other distribution centers, etc. cover a large percentage of urban land area. The map above shows increasing percentage of impervious surfaces in darker shades of pink. Among the data used to identify impervious surfaces are satellite observations of city lights at night. (Map by Robert Simmon, based on data from Chris Elvidge, NOAA National Geophysical Data Center.)

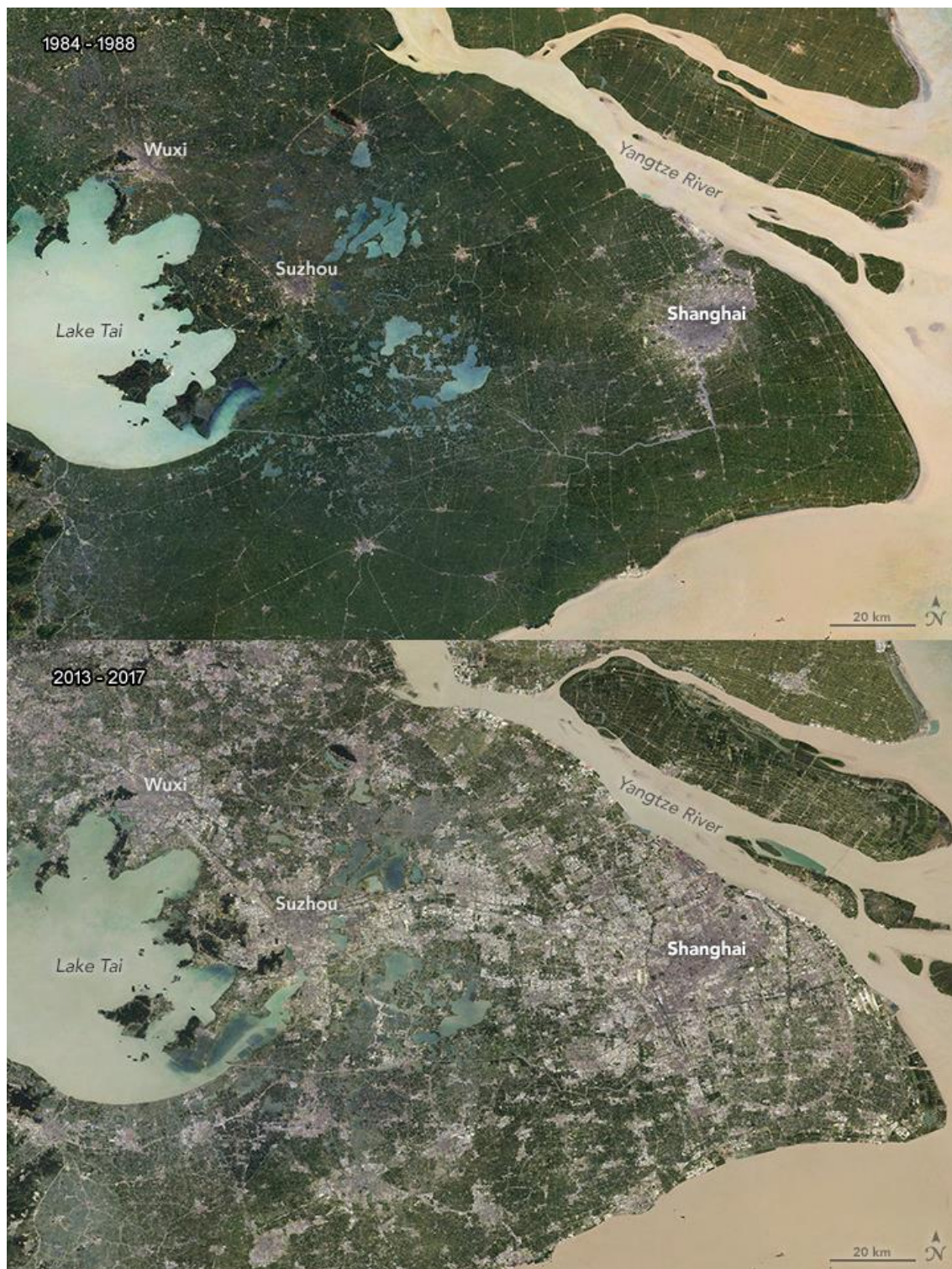
<https://earthobservatory.nasa.gov/Features/Lawn/lawn2.php>

Vast portions of the Earth have been, and are still, being permanently sealed as a result of city expansion, with most cities sealing 70% or more of the municipality areas with buildings, roads, sidewalks, parking lots, and other structures. In the wake of this invasion, millions of faunae and florae have perished as a result of habitat destruction, and many species having been extirpated. In 2013, the CIA estimated there were 64,285,009 km or 39,944,852 miles of paved and unpaved roads in the world. (474) These roads have sealed portions of the Earth while also fragmenting habitats and disrupting migration routes for some migrating species. These roads also allow rainwater and snowmelt runoff to easily collect oil, heavy metals, trash, road salt, and other toxic chemicals, and then transport them into the hydrosphere. In addition, when the rainwater falls onto hard city surfaces, the water runs off and is taken away by rivers and the water never reaches the ground to replenish the water table, ultimately resulting in the many areas becoming drier and drier.

City infrastructures are built and maintained with collected taxes, yet many lack even the most basic maintenance, and when there are budget problems because of poor management it is the citizens which ultimately pay the price and suffer. When so many cities were struggling during the 2008 financial crisis, educational services like library hours were the first to see cutbacks, city workers were laid off, recreation programs were slashed, and some cities even cut other vital services like police and fire protection and trash service. Some cities around the world either charge for restroom access or do not even offer a public restroom, forcing their citizens to urinate and defecate on the city sidewalks when they can no longer wait or have no other option. In addition to paying taxes, tolls and parking meters levy a charge to drive and park on certain roads. Many city streets around the world have fallen into ruin from lack of maintenance, as the money which is collected in the form of taxes and which is supposed to be spent wisely on services for the citizens and the maintenance of the city's infrastructure, are diverted and spent on other useless things, or they are stolen by greedy politicians and their business associates in the form of a \$435 claw hammer or a \$437 measuring tape (546) with little or no consequences. How can the federal government and most states say that parks and other protected areas of nature are for the citizens and belong to the citizens and yet charge for access to them? Shouldn't tax dollars be used for maintaining parks and allow access to all for free?



SOURCE: NASA - For more than four decades, Landsat satellites have collected images of Shanghai. This series from Landsat 5, 7, and 8 shows the city's growing footprint between 1984 and 2016. Developed areas appear gray and white; farmland and forests are green; shallow, sediment-filled water is tan. <https://earthobservatory.nasa.gov/Features/WorldOfChange/shanghai.php>



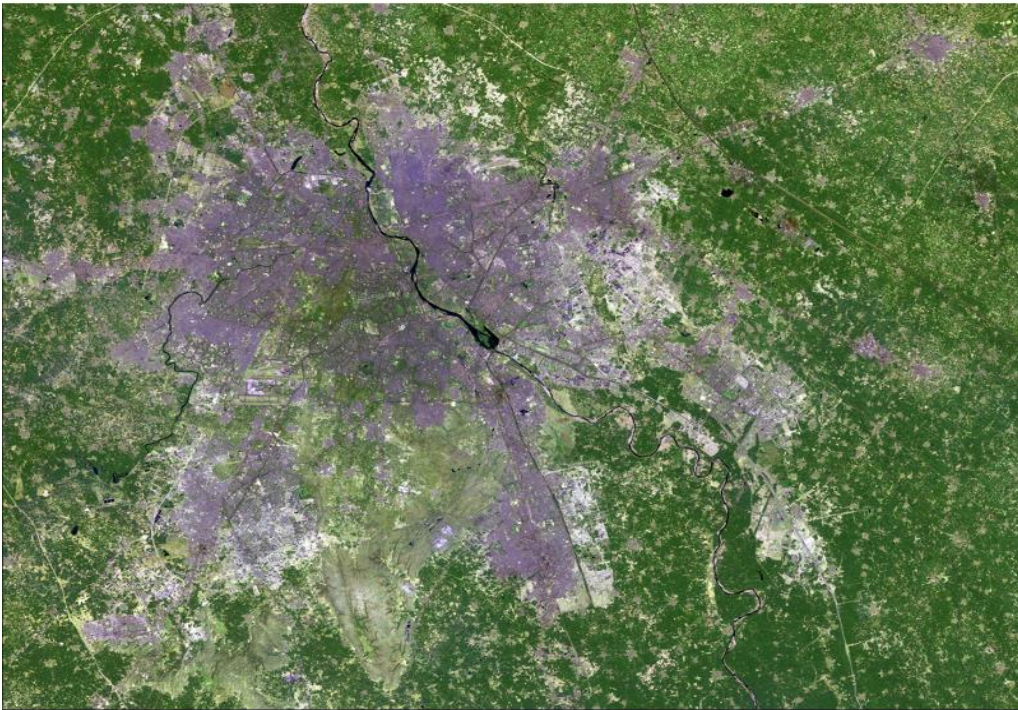
SOURCE: NASA - In 1984, the core of the city was centered on the west bank of the Huangpu River, a manmade tributary of the Yangtze River. Since then, Shanghai has expanded in all directions, filling in what had mainly been farmland with new housing, factories, shopping, parking lots, and roads. Pudong, the once rural district west of Huangpu River, now has a population of more than 5 million people and is home to some of Shanghai's tallest and most iconic buildings. Unlike the images at the top of the page, each of which captures one day roughly every five years, these "best-pixel mosaics" are made up of small parts of many images captured over five-year periods. The first image is a mosaic of scenes captured between 1984 and 1988; the second shows the best pixels captured between 2013 and 2017. This technique makes it possible to strip away clouds and haze, which are common in Shanghai.

<https://earthobservatory.nasa.gov/Features/WorldOfChange/shanghai.php>

March 14, 1991



March 2, 2016



Source: U.S. Geological Survey (USGS) Landsat Missions Gallery; “New Delhi Among Fastest Growing Urban Areas in the World;” U.S. Department of the Interior / USGS and NASA. Images taken by the Thematic Mapper on board Landsat 5 and the Operational Land Imager onboard Landsat 8. Urban expansion in New Delhi, India March 14, 1991 - March 2, 2016 Between the times these two images were taken, the population of India’s capital and its suburbs (known collectively as “Delhi”) ballooned from 9.4 million to 25 million. It is now second in population only to Tokyo, which has 38 million people. The United Nations Report on World Urbanization projects that Delhi will have 37,000,000 residents by 2030.



SOURCE: NASA - To expand the possibilities for beachfront tourist development, Dubai, part of the United Arab Emirates, undertook a massive engineering project to create hundreds of artificial islands along its Persian Gulf coastline. Built from sand dredged from the sea floor and protected from erosion by rock breakwaters, the islands were shaped into recognizable forms, including two large palm trees. The first Palm Island constructed was Palm Jumeirah, and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) on NASA's Terra satellite observed its progress from 2000 to 2011. In these false-color images, bare ground appears brown, vegetation appears red, water appears dark blue, and buildings and paved surfaces appear light blue or gray.

<https://earthobservatory.nasa.gov/Features/WorldOfChange/dubai.php>

May 1, 1985



May 1, 2014



Source: U.S. Geological Survey (USGS) Landsat Missions Gallery "Huang He Delta and Laizhou Bay," U.S. Department of the Interior / USGS and NASA. Images taken by the Thematic Mapper onboard Landsat 5 and the Operational Land Imager onboard Landsat 8. Huang He (Yellow) delta growth, China May 1, 1985 - May 1, 2014 China's Huang He (Yellow) River is the most sediment-filled river on Earth. Each year, it transports millions of tons of soil from a plateau it crosses to a delta it has built in the Bohai Sea. These images show the delta's growth from 1985 to 2014. The latter image also shows another change: ponds that hold shrimp and other seafood (seen here as dark geometric shapes along the coastline) were built on what were once tidal flats.

Water Consumption, Desertification, and Surface Water and Groundwater Depletion

In 2017, it was estimated that 70% of world water consumption is from agricultural related activities, 19% is consumed for industrial related purposes, and 11% is consumed by municipalities. (352) The majority of the agricultural water consumption is from livestock agriculture, which uses far more than flora-based agriculture as can be seen in the previous table Average Water Consumption for Meat and Dairy Production. By reducing or ultimately eliminating meat and dairy consumption, water consumption could be drastically reduced, while also producing less contaminated water through use. Better water management practices from the individual to the commercial level would also help to ensure water is not wasted and instead goes towards a positive use. Since the 1990's, the Delaware Aqueduct, which provides half of New York City's municipal water, has been leaking between 15,000,000 to 35,000,000 gallons of water per day. In 2010, the city announced a plan to address the leaks and construction is expected to continue through the year 2021. (355) Why has the government known about this leak and yet allowed it to persist for so long? Why has this waste of such a precious resource like water been tolerated? How much water is lost from millions of leaky faucets constantly dripping?

Good tasting drinkable water is not freely available in the vast majority of cities around the world because of either a contaminated source, improper treatment, or old deteriorating pipes. A 2009 Associated Press investigation about pharmaceuticals in America's drinking water, found a variety of pharmaceuticals which included antibiotics, anti-convulsants, mood stabilizers, and sex hormones in the drinking water supplies of at least 41,000,000 Americans in two dozen major American metropolitan areas. (615) Drinking water has become just another industry in which many thirsty *Homo sapiens* must resort to a commercial company in order to obtain properly purified, good quality tasting water from a reliable source. In 2015, global bottled water consumption was 87,000,000,000 gallons. (506) If one brews coffee or tea utilizing tap water from an ordinary sink, versus commercially filtered spring water there usually is a vast difference in taste between the two. And an even greater taste difference between water consumed from an old plastic container which has absorbed liquid odors over time versus a glass vessel. Have *Homo sapiens* drank from plastic containers so much they no longer notice this taste difference? Why should citizens be forced to buy bottled water and purification systems using more plastic and creating more waste, shouldn't the water be clean directly from the pipes and ultimately from the sources the municipalities tap? How can a municipality collect taxes and still charge citizens a monthly fee for water while also delivering such poor-quality water?

Since the 1950's, water fluoridation, adding fluoride to the municipal water supply, has been a forced medical treatment by governments on the population in an attempt to reduce cavities. Today it is forced on citizens of 25 countries around the world by medicating the water of 435,000,000 *Homo sapiens*, most of whom have no idea their water has been tainted, and none of whom have given consent for this medical treatment. In some municipalities, excessive amounts of fluoride have been added which has led to overfluoridation in some of the population causing severe dental fluorosis, skeletal fluorosis, and weakened bones. Does this forced medical procedure really even work, as there were still around 175,000,000 filling operations every year in the United States alone? (54) (How can governments, based on the recommendations of just a few doctors, unethically force this medical treatment on their citizens? Can citizens not obtain adequate levels of fluoride from fresh fruits and vegetables that also contain calcium, iron, potassium, phosphorus, niacin, folic acid, B12, B2, B6, zinc, vitamin A, vitamin C, and vitamin E, which also promote healthy teeth and gums? Would not promoting better dietary habits and dental hygiene perhaps be equally, if not more effective?

Around 10,000,000 homes and buildings in the United States receive water from service lines that are at least partially lead pipes. (199) In the United States, from 1999 to 2010, an estimated 1,200,000 children aged 12 months to 5 years old had elevated blood lead levels with 607,000 cases reported to the CDC. (339) Why are lead pipes still used when they can possibly cause lead poisoning which is fatal and irreversible? Why has such a known and easily preventable toxic exposure issue been allowed to continue in a nation which has the technology and financial ability to so easily correct it?

May 15, 1984



May 23, 2016



Source: U.S. Geological Survey (USGS) Landsat Missions Gallery; Lake Mead Reaches Historic Low; U.S. Department of the Interior / USGS and NASA. Images taken by the Thematic Mapper on board Landsat 5 and the Operational Land Imager onboard Landsat 8. Lake Mead at record low May 15, 1984 - May 23, 2016 Lake Mead, the largest reservoir in the U.S., has fallen to the lowest level since it began filling in the 1930s, the result of 16 years of drought in the Colorado River Basin. The 1984 image shows the lake nearly full, compared to 37 percent full in the 2016 image. Lake Mead supplies water to 25 million people, including virtually all of Las Vegas and farms, tribes and businesses in Arizona, California, Nevada and northern Mexico. Also see this image pair.



SOURCE: NASA - The Colorado River flows from the Rocky Mountains in Colorado through the southwestern United States. Along its route, the river passes through an elaborate water-management system designed to tame the yearly floods from spring snowmelt and to provide a reliable supply of water for residents as far away as California. The system is appreciated for the water it supplies, but criticized for the environmental problems and cultural losses that have resulted from its creation.

Among the dams on the Colorado is Arizona's Glen Canyon Dam, which creates Lake Powell. The deep, narrow, meandering reservoir extends upstream into southern Utah. In the early 21st century, this modern marvel of engineering faced an ancient enemy: prolonged drought in the American Southwest. Combined with water withdrawals that many believe are not sustainable, the drought has caused a dramatic drop in Lake Powell's water level.

Global warming is expected to make droughts more severe in the future. Even in "low emission" climate scenarios (forecasts that are based on the assumption that future carbon dioxide emissions will increase relatively slowly), models predict precipitation may decline by 20-25 percent over most of California, southern Nevada, and Arizona by the end of this century. Precipitation declines combined with booming urban populations will present a significant challenge to Western water managers in the near future.

https://earthobservatory.nasa.gov/Features/WorldOfChange/lake_powell.php

April 12, 2013



January 15, 2016



Source: NASA Earth Observatory - Images taken by the Operational Land Imager onboard Landsat 8 - Drying Lake Poopó, Bolivia April 12, 2013 - January 15, 2016 Lake Poopó, Bolivia's second-largest lake and an important fishing resource for local communities, has dried up once again because of drought and diversion of water sources for mining and agriculture. The last time it dried was in 1994, after which it took several years for water to return and even longer for ecosystems to recover. In wet times, the lake has spanned an area approaching 1,200 square miles (3,000 square kilometers). Its shallow depth—typically no more than 9 feet (3 meters)—makes it particularly vulnerable to fluctuations.

Overuse and prolonged droughts resulting from shifting weather patterns caused by global warming, have both contributed to major water level decreases in some lakes and other bodies of water throughout the world. Desertification is usually a natural occurring event caused by climate shifts, but in recent decades it has been attributed to anthropogenic activities in the ecosystem, mainly overgrazing, agriculture, and deforestation which have ultimately led to land exhaustion. The Aral Sea was once the fourth largest lake in the world, but now, because of anthropogenic activities and ultimately overuse, it is now a dry toxic barren wasteland from all the

pesticides, fertilizers, and microbiological warfare experiments. And the once natural dust storms of the past, are now literally toxic dust storms blowing these toxic elements around. A dam and over-exploitation by means of irrigation to grow food crops and cotton, a high water consuming crop, in an arid climate has resulted in the lake literally disappearing within 37 years, along with the flora and fauna species, some no doubt endemic. Mark Synnott in the June 2015 National Geographic Magazine stated,

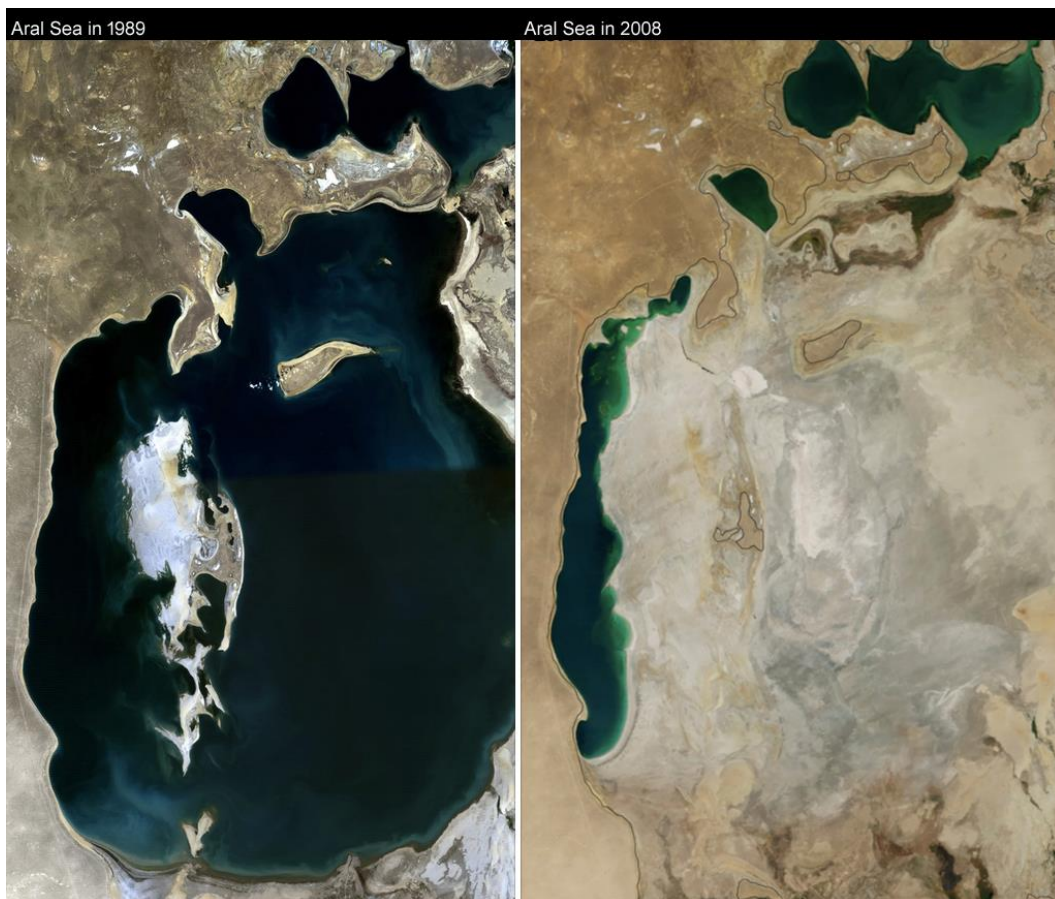
"Besides toxic levels of sodium chloride, the dust is laced with pesticides such as DDT, hexachlorocyclohexane, toxaphene, and phosalone—all known carcinogens. The chemicals have worked their way into every level of the food chain.

Today Karakalpakstan registers esophageal cancer rates 25 times as high as the world average. Multidrug-resistant tuberculosis is a major problem, and respiratory diseases, cancers, birth defects, and immunological disorders are widespread.

Perhaps even more frightening is the revelation that the Aral Sea once was home to a secret Soviet biological weapons testing facility. Located on Vozrozhdeniya Island—which, now that the sea is gone, is no longer an island—the facility was the main test site for the Soviet military's Microbiological Warfare Group. Thousands of animals were shipped to the island, where they were subjected to anthrax, smallpox, plague, brucellosis, and other biological agents.

When the Aral was healthy, the water was brackish, with a salinity level of 10 grams per liter (the world's oceans range from 33 to 37 grams per liter). Today the salinity exceeds 110 grams per liter, making it deadly to every species of fish."

The Aral Sea is yet another chapter in the history of *Homo sapiens* destructive hand on the fragile environment of Earth, and the consequences of those actions. Will this lake ever cover 26,000 square miles again? Possibly over time with proper conservation, but the endemic species of florae and faunae that have may have already become extinct will never return. How inhabitable is the area now or in the future to most florae or faunae because of the salinity, fallout from the toxic fertilizers and pesticides that were used during the cotton farming, and the remaining side effects of the microbiological warfare experiments?



SOURCE: NASA - Aral Sea in 1989 (left) and in 2008 (right) –
<https://earthdata.nasa.gov/earth-observation-data/near-real-time/rapid-response>



SOURCE: NASA - Overuse and other anthropogenic activities led to the rapid depletion of Lake Chad in Africa.



SOURCE: NASA – “Key reservoirs in South Africa’s Western Cape province have dropped to critical levels. At the start of November 2017, Theewaterskloof reservoir, the largest in the province’s water supply system, had dropped to 27 percent of capacity. Voëlvlei, the second largest, was at 28 percent of capacity.

Following two successive dry years, the Western Cape government declared the province a disaster area in May 2017. With the rainy season (April through September) now past, hopes that nature would ease the drought this year have faded.

The two satellite images above show Theewaterskloof before and during the drought. The top image was acquired on October 18, 2014, when the reservoir was at full capacity. The second image was collected on October 10, 2017, when it was at 27 percent capacity. Notice the tan “bathtub ring” of exposed sediment around the edges of the basin—an indication of lowered water levels.” <https://earthobservatory.nasa.gov/IOTD/view.php?id=91217>

September 24, 2011



September 20, 2016



SOURCE: NASA – “For more than 150 years, humans have been taking more water out of the Salt Lake watershed than is flowing into it. They are now diverting about 40 percent of the river water (which would normally fill the lake) and using it for farming, industry, and human consumption. In October 2016, the Great Salt Lake reached its lowest recorded level: 1277.5 meters (4,191.2 feet), averaged between the lake's north and south arms. Five years of drought in the American West have contributed to the recent drop in the water line, as have higher-than-normal temperatures. But the region has seen dry cycles before, and according to scientists, there has not been a significant long-term change in precipitation in the basin.

Nonetheless, the volume of water in Great Salt Lake has shrunk by 48 percent and the lake level has fallen 3.4 meters (11 feet) since 1847.

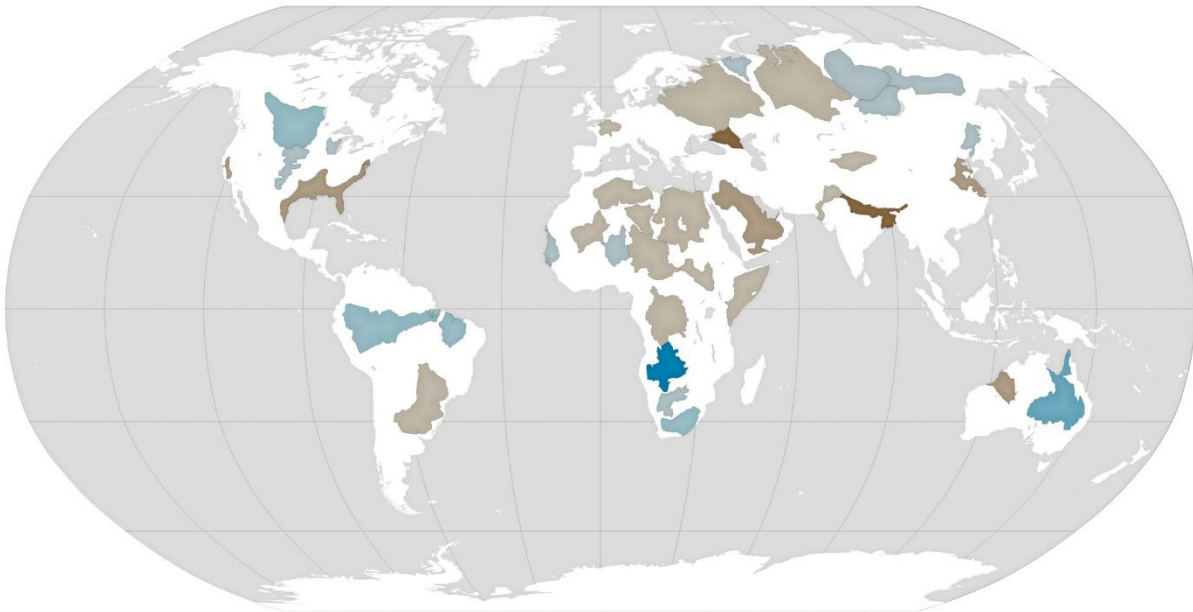
In a white paper released in February 2016, Wurtsbaugh and colleagues described the impact of water development on the Great Salt Lake. Using hydrogeologic data and models, the team found that river flow into the basin—from the Bear, Jordan, and Weber rivers—has been reduced 39 percent since the middle of the 19th century. Water that once spread across roughly 4100 square kilometers (1,600 square miles) now covers just 2700 square kilometers (1,050 square miles). “The solution to the water issue is greater conservation, particularly for agricultural irrigation,” said Wurtsbaugh. The state has been promoting water conservation for urban and suburban areas, but this is only about 8 percent of water use. And while per person water use is down by 18 percent, those gains are offset by a growing population that is increasing overall water use.

The hardest work lies in convincing farmers to do more with less, as approximately 63 percent of the water usage goes to agriculture. Researchers and conservationists are also concerned about future plans for development along Bear River, the largest tributary flowing to the lake. The loss of water in Great Salt Lake has led to more and larger dust storms in the area, while making it harder for companies to get the water they need for extracting salt and other minerals, a key piece of the local economy. Marinas and other water recreation operations are also struggling with the moving shoreline.” -

<https://earthobservatory.nasa.gov/IOTD/view.php?id=88929>

For thousands of years *Homo sapiens* have constructed simple wells and pumps to access groundwater, but over the last 75 years technology has now allowed *Homo sapiens* to pump vast quantities of previously inaccessible groundwater to the surface for use. If the water table is not allowed to be replenished because of sealed surface areas and overuse, it will only become shallower and shallower until it eventually it becomes completely exhausted. Throughout history, groundwater depletion has been an issue with some civilizations, the Maya civilization may have perhaps collapsed in part as a result of groundwater depletion, and although an earthquake initiated the cracking of the limestone beneath Ubar, the ancient fabled city was ultimately swallowed into the Earth as a result of groundwater depletion. Nicholas Clapp wrote that,

“Over millennia, Ubar's great well had watered countless caravans and had been drawn upon to irrigate a sizable oasis. Hadsan by handsan, its water had receded, and the limestone shelf on which the fortress rested became less and less stable, for it was the water underneath Ubar that quite literally held the place up. If, as in legend, there was a severe drought - and ever more reliance on a single, dwindling spring - the situation would have become critical.” (560)



SOURCE: NASA – “About one third of Earth’s large groundwater basins are being rapidly depleted by human consumption even though we have scarce and inaccurate data about how much water remains in them, according to two new studies published in June 2015 in *Water Resources Research*. This means significant segments of Earth’s population are consuming

groundwater without knowing when it might run out. “Groundwater is currently the primary source of freshwater for approximately two billion people,” the researchers wrote. “Despite its importance, knowledge on the state of large groundwater systems is limited as compared to surface water, largely because the cost and complexity of monitoring large aquifer systems is often prohibitive.”

The map above shows the annual change in groundwater storage from 2003 to 2013 in the 37 largest aquifer systems in the world. Basins shown in shades of brown have had more water extracted in the study years than could be naturally replenished; basins in blue saw increases in underground water storage, perhaps due to changes in precipitation, ice or permafrost melting, or changes in surface water. The multidisciplinary research team found that 13 of Earth’s 37 largest aquifers are being depleted while receiving little to no recharge. Eight were classified as “overstressed,” with almost no natural replenishment to offset usage, while the other five were found to be highly stressed, with that rate of extraction far exceeding the little bit of natural replenishment. Climate change and population growth are expected to intensify the problem.” - https://earthobservatory.nasa.gov/IOTD/view.php?id=86263&eocn=image&eoci=related_image

Groundwater depletion related sinkholes have been observed in Florida (479), and land subsidence is occurring worldwide because of groundwater depletion. Over the last 100 years, some areas and cities, like: the San Joaquin Valley, Mexico City, Shanghai, New Orleans, Bangkok, Beijing, and others have been sinking as a result of groundwater depletion. Groundwater depletion has also become widespread throughout the United States. The USGS reported that,

“Atlantic Coastal Plain - In Nassau and Suffolk Counties, Long Island, New York, pumping water for domestic supply has lowered the water table, reduced or eliminated the base flow of streams, and has caused saline groundwater to move inland.

Many other locations on the Atlantic coast are experiencing similar effects related to groundwater depletion. Surface-water flows have been reduced due to groundwater development in the Ipswich River basin, Massachusetts. Saltwater intrusion is occurring in coastal counties in New Jersey; Hilton Head Island, South Carolina; Brunswick and Savannah, Georgia; and Jacksonville and Miami, Florida.

Gulf Coastal Plain - Several areas in the Gulf Coastal Plain are experiencing effects related to groundwater depletion: Groundwater pumping by Baton Rouge, Louisiana, increased more than tenfold between the 1930s and 1970, resulting in groundwater-level declines of approximately 200 feet. In the Houston, Texas, area, extensive groundwater pumping to support economic and population growth has caused water-level declines of approximately 400 feet, resulting in extensive land-surface subsidence of up to 10 feet. Continued pumping since the 1920s by many industrial and municipal users from the underlying Sparta aquifer have caused significant water-level declines in Arkansas, Louisiana, Mississippi, and Tennessee. The Memphis, Tennessee area is one of the largest metropolitan areas in the world that relies exclusively on groundwater for municipal supply. Large withdrawals have caused regional water-level declines of up to 70 feet.

High Plains - The High Plains aquifer (which includes the Ogallala aquifer) underlies parts of eight States and has been intensively developed for irrigation. Since predevelopment, water levels have declined more than 100 feet in some areas and the saturated thickness has been reduced by more than half in others.

Pacific Northwest - Groundwater development of the Columbia River Basalt aquifer of Washington and Oregon for irrigation, public-supply, and industrial uses has caused water-level declines of more than 100 feet in several areas.

Desert Southwest - Increased groundwater pumping to support population growth in south-central Arizona (including the Tucson and Phoenix areas) has resulted in water-level declines of between 300 and 500 feet in much of the area. Land subsidence was first noticed in the 1940s and subsequently as much as 12.5 feet of subsidence has been measured. Additionally, lowering of the water table has resulted in the loss of streamside vegetation.

Chicago-Milwaukee area - Chicago has been using groundwater since at least 1864 and groundwater has been the sole source of drinking water for about 8.2 million people in the Great Lakes watershed. This long-term pumping has lowered groundwater levels by as much as 900 feet.” (480)

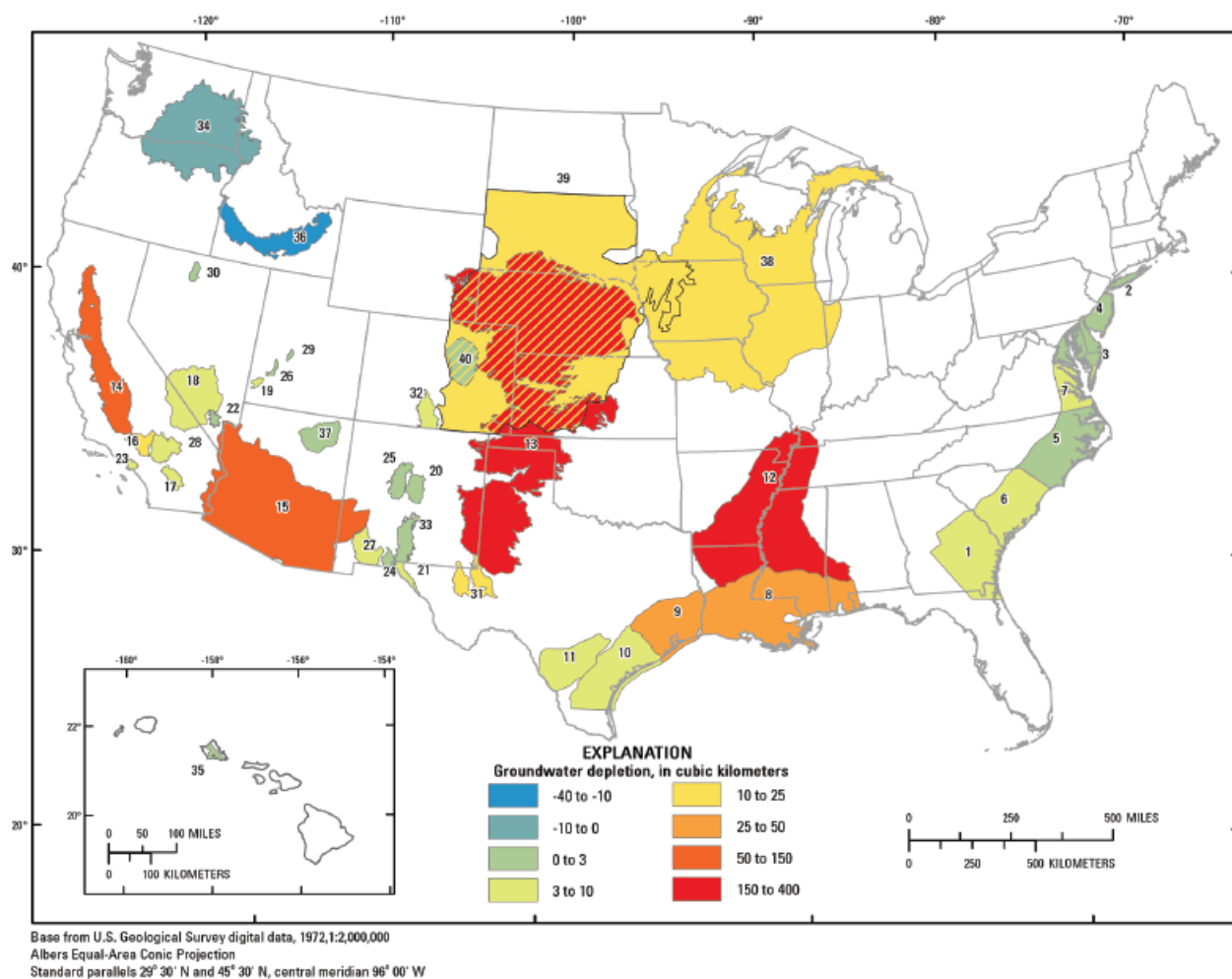


Figure 2. Map of the United States (excluding Alaska) showing cumulative groundwater depletion, 1900 through 2008, in 40 assessed aquifer systems or subareas. Index numbers are defined in table 1. Colors are hatched in the Dakota aquifer (area 39) where the aquifer overlaps with other aquifers having different values of depletion.



March 31, 1987



December 7, 2000 + May 16, 2001

SOURCE: NASA – “The Amistad Reservoir is located on the Rio Grande along the border of the United States and Mexico. Combined with the Falcon Reservoir downstream of it, Amistad regulates the flow of the Rio Grande for downstream users. Combined, these two reservoirs are running around thirty-three percent of full capacity, the lowest levels recorded since they were first constructed in the 1960s. During the summer of 2002, it was possible to walk across the mouth of the Rio Grande without getting wet: where the river normally met the sea at the Gulf of Mexico, there was only a dry, sandy beach. U.S. border patrol officers placed an orange nylon fence in what should have been the riverbed to discourage unintended international beach strolls.

This pair of Landsat images of the Amistad International Water Reservoir shows the changes in the lake level between 1987 and 2000. The early image in the spring of 1987 shows a healthy supply of water behind the dam. But by late 2000, water

levels had dropped dramatically. This trend has continued and even intensified since these images were acquired. The reduced water levels are the result of a combination of forces on the water supply. First and foremost is that the area is in the midst of a major sustained drought in which, year after year, land in the drainage basin of the upper Rio Grande has received little in the way of rain or snow. Water deliveries from tributaries in northern Mexico have been well below historical norms for the past decade.

In addition, population in the area has been growing at extraordinary rates. Factories in northern Mexico just across the border have blossomed, bringing people into the area for jobs. In 1970, not long after the Amistad and Falcon international water reservoirs were completed, the population of the lower Rio Grande valley was estimated to be around 1.1 million. In 2003, it is roughly 2.2 million. The population has doubled in just over thirty years. This trend is expected to continue with a population of roughly 4.9 million anticipated by 2030. But while the population had grown, the water supply has not. The prioritization system for water use in the valley puts municipal needs first. This system has greatly affected agriculture. Between 1997 and 2001, agricultural water supply was reduced by 42% compared to the five years prior. Over a hundred thousand acres of agricultural land have been taken out of production in Cameron and Hidalgo counties since 1992 for lack of water to irrigate them.

Normally, the water released from the reservoir for agricultural maintains the flow of water to the municipal users downstream. But when the agricultural releases are restricted, water flows above and beyond the municipal demands are needed just to maintain the river flow to the cities' water intakes. Further complicating the water situation, water weed infestations clog the waterways and restrict flow, requiring still greater volumes of water to be released from upstream to get the river water to its destinations. In Matamoros, the river level has actually fallen below the city's intake pipes, while in Brownsville last year, the local water authority had to clear clogged weeds off the intake grates. A final environmental insult of the low water levels is the concentration of pollutants and runoff contaminants in the water. Wildlife that depends on the river, from birds to shrimp, has been adversely affected.” -

https://earthobservatory.nasa.gov/IOTD/view.php?id=3739&eocn=image&eoci=related_image

Wastewater and Sewage Sludge

Between all the clothes, automobiles, dishes, homes, and even *Homo sapiens* themselves, Earth's hydrosphere not only helps to wash these things, but it also transfers the enormous amount of dirt, bacteria, toxic chemicals, and other things that *Homo sapiens* come in contact with daily to Earth's other spheres and the ecosystems within these spheres. (e.g. motor oil from the clothes of auto mechanic to the hair product chemicals of a hairstylist, most all professions expose the worker to some sort of toxic chemicals, these chemicals can be transferred to the workers clothing and then to the hydrosphere when doing laundry) Additional toxic chemicals are further added during the cleaning process by means of a cleanser or soap product, very few of which are biodegradable or natural and are fatal if ingested by living organisms.

Over 80% of the world's wastewater containing raw sewage, chemicals, agricultural runoff, and other toxically discarded wastewater, is released into the environment without treatment contaminating aquatic ecosystems. (353) In 2012, an estimated 1,800,000,000 *Homo sapiens* globally used a source of drinking water that was faecally contaminated. (354) How can the western world be utilizing so much clean water on things like washing an automobile, maintaining a golf course, swimming pool, or aesthetically pleasing lawn, while at the same time 1,800,000,000 globally are drinking faecally contaminated water?

7,300,000,000 *Homo sapiens* produce an enormous amount of feces, urine, and wastewater from cleaning. Some of this waste is treated by a wide range of methods, and the by-product is sewage sludge. Heavy amounts of hormones, steroids, prescription drugs (mainly antidepressants and antihistamines) (6), nutritional supplements, lead, silver, arsenic, copper, chromium, cadmium, and other toxic chemicals are present in the sewage sludge of the United States and many other industrialized nations. In short, anything excreted by *Homo sapiens* or any products which are used and then go down the drain ends up composing sewage sludge. Much of this treated sewage sludge, called biosolid, is spread over or injected into soils and used as a fertilizer on agricultural crops. Studies have shown that flora bioaccumulate large quantities of heavy metals and toxic pollutants which are then consumed by humans. (45) Why is this toxic waste being used on food crops? M. B. Kirkham states that,

“Industrialized sludges, of course, can contain high concentrations of trace elements. Source control with limits on discharges of toxic trace elements is practiced by cities that use their sludge for agricultural purposes. But even the tightest source control is unlikely to reduce the trace-element content much below the median value. This is because household products contain trace elements. The trace elements likely to cause toxicities to plants in soils treated with large amounts (for example, 400 t ha⁻¹) of domestic sludge for a number of years (15 yr) are cadmium, copper, zinc, boron, and possibly nickel.

Cadmium is the element of most concern in sludge, because it poses the greatest threat to human health. Food obtained from plants grown on sludge treated soil might contain concentrations of cadmium toxic to man and animals. Cadmium is used in electroplating, pigments, chemicals, batteries, alloys, photographic supplies, fungicides, as well as other products. Even though industrial sources of cadmium in sludge can be controlled, domestic sources cannot. For example, cigarette ends flushed down toilets raises the cadmium concentration in sludge, because tobacco has a high concentration of cadmium.” (5)

Sewage sludge can also have an effect on soil organisms, and like most other pollution on Earth it can very easily enter the food chain as Kirkham further points out in writing,

“One result of sludge disposal on land is an increase in earthworms. Trace elements also can accumulate in earthworms that live in polluted soils, thereby entering the food chain, when birds eat the worms.” (5)

A 2017 assessment of irrigated croplands being influenced by urban wastewater flows stated,

“When urban areas expand without concomitant increases in wastewater treatment capacity, vast quantities of wastewater are released to surface waters with little or no treatment. Downstream of many urban areas are large areas of irrigated croplands reliant on these same surface water sources. Case studies document the widespread use of untreated wastewater in irrigated agriculture, but due to the practical and political challenges of conducting a true census of this practice, its global extent is not well known except where reuse has been planned...This study found that 65% (35.9 Mha) of downstream irrigated croplands were located in catchments with high levels of dependence on urban wastewater flows. These same catchments were home to 1.37 billion urban residents.

Our analysis provides the first spatially-explicit global estimates of the extent to which irrigated croplands are influenced by wastewater, both treated and untreated, finding 35.9 Mha of irrigated croplands located in wastewater dependent catchments (RFR \geq 20%), of which 82% (29.3 Mha) are located in countries where less than 75% of wastewater is treated. 86% of these irrigated croplands were located in five countries: China, India, Pakistan, Mexico, and Iran.” (402)

A 2017 evaluation of 2003 to 2013 FDA collected and assayed data found that 20% of baby food samples, and 14% of other food samples had detectable levels of lead. (440) While the FDA has acceptable limits for lead exposure, the CDC clearly states,

“Protecting children from exposure to lead is important to lifelong good health. **No safe blood lead level in children has been identified.** Even low levels of lead in blood have been shown to affect IQ, ability to pay attention, and academic achievement. And effects of lead exposure cannot be corrected.” (441)

Why does lead and other toxic chemicals have acceptable levels of ingestion or exposure? If something is toxic should not the acceptable level of ingestion or exposure be 0 and nothing more?

Golf Courses

Large amounts of land have been converted into golf courses, with each course occupying between 100 and 200 acres. In March 2015, there were 34,011 golf courses in the world along with almost 700 additional golf courses either under construction or in the advanced planning stages. Most of these golf courses, were located within the United States, Japan, Canada, England, Australia, Germany, France, Scotland, South Africa, and Sweden. (18) The environmental impact of these courses can be considerable, from the destruction of the ecosystem when creating the golf course, to using harmful fertilizers and pesticides for maintenance. Further impacts can be felt when billions of gallons of water are used each year to sustain the pristine green grass, with the typical golf course using between 100,000 and 1,000,000 gallons of water per day during the summer. (209)

Artificial Snow

In the 1950s, snowmaking technology was developed which allowed for artificial snow in places where once no ski resort could have been before, in fact without this technology many ski resorts throughout the world would not exist. Artificial snow was used extensively during the 2014 and 2018 Winter Olympics. Currently there are around 5,500 ski resorts in the world, and many of them are in areas which now have warmer winters, so they have begun to rely even more heavily on artificial snow. With global warming there will most likely be far less

snow in the future, and in some areas perhaps even none at all forcing resorts to rely even more on artificial snow. Snowmaking utilizes vast amounts of water and energy resources and there are also severe impacts on mountain ecosystems. It takes 106 gallons of water to produce one cubic meter of snow, and the average snowmaking machine use about 107 gallons of water per minute. A significant amount of the water being used is lost through evaporation and is never returned to the water table. The water used is often mineralized during the snow making process which can potentially contaminate the soil and groundwater supply when the snow melts.

Swimming Pools and Hot Tubs

According to the CDC, there are 10,700,000 swimming pools and 7,300,000 hot tubs in the United States alone. (34) It is estimated that swimming pools in the United States lose 150,000,000,000 gallons of water every year as a result of evaporation. Many of these swimming pools are nothing more than an extreme waste of water as they are infrequently used for swimming and are a nothing more than a symbol of social status or display of wealth. Swimming pools and hot tubs consume an enormous amount of resources, from the energy is used for pumping water and sometimes heating the water, to the water consumption from draining and cleaning the pool as well as through natural evaporation. In addition, pools are also a toxic mix of chlorine and other chemicals which are used to maintain the water and can potentially go into the soils and water table, or if not carefully measured can cause chlorine toxicity to those swimming in the pool. Swimming pools can also act as disease incubators and faunae can potentially drown in them or be affected negatively from the chemicals used in the pool. These swimming pools and hot tubs also lock-up vast amounts of fresh water which has been tainted with chemicals, with each swimming pool holding between 50,000 and 660,000 gallons of water and each hot tub holding around 400 gallons of water.

Watercraft

Worldwide, there are millions of commercial and recreational watercraft which have a negative impact on the environment in various ways, such as carbon emissions, gasoline, oil, and other chemicals leaking into the water, boat propellers and other collisions can injure and even kill marine faunae, and the landscape itself can be damaged through fishing and from modifications to accommodate large watercraft. Motorized fishing and tour boats that visit remote areas of nature are similar to off highway vehicles (OHV), in that they also pollute once pristine aquatic ecosystems. In 2014, there were an estimated 4,600,000 fishing vessels worldwide, with 64% of reported fishing vessels being engine-powered. (543) There were also 11,804,002 registered recreational watercraft in the United States alone, in addition to the thousands of Navy and Coast Guard watercraft which patrol the coastlines, oceans, and other waterways of the world.

As of 2017, there were more than 300 cruise ships operating around the world, with more than 22,100,000 *Homo sapiens* going on cruise ships in 2014. (170) Since the year 2000, there have been 60 new cruise ships constructed weighing more than 100,000 gross tonnes, with an additional 40 currently under construction. (169) Cruise ships consume mass amounts of fuel and emit large amounts of carbon dioxide. Some cruise lines have been known to intentionally pollute marine environments when they discharge sewage, grey water, oily bilge water, garbage, or other hazardous waste while in port, but more especially while sailing in international waters where laws do not apply. In April 2017, a United States federal judge issued the largest water pollution fine in U.S. history to Princess Cruise Lines in the amount of \$40,000,000 for dumping oil waste into the Atlantic Ocean and Gulf of Mexico bypassing the ship's filtration systems in an effort to save money. (344) Previously, from 1996 to 2001, in the Atlantic Ocean, Caribbean, and Gulf of Mexico, Carnival Cruise Lines dumped oily waste, and agreed to pay a \$18,000,000 fine in 2002. In 1999, Royal Caribbean plead guilty to similar charges and also paid a \$18,000,000 fine. (411) Why are these cruise lines allowed to repeatedly break the laws with little to no consequences? When a company generates more than \$8,000,000,000 in revenue, is an \$18,000,000 fine really going to deter future illegal activities?

In 2017, there were around 6,000 active cargo ships operating throughout the world, (249) most are powered by massive diesel engines which operate 24/7 emitting atmospheric pollution, and like cruise ships they also have the potential to discharge sewage, grey water, oily bilge water, garbage, and other hazardous waste. Another

impact of commercial ships is the anthropogenic noise generated, and over the last 150 years it has become so intense that right whales may shift their call frequency to compensate for the increased band-limited background noise. (531) Each year, cargo ships loose nearly 10,000 or more shipping containers, some containing thousands and even millions of individual consumer products. (245) Can these containers not be made airtight, so they float and be more securely attached to the shipping vessel? Can they not be outfitted with GPS to be salvaged, instead of just left at sea to potentially release their cargo polluting the oceans and beaches? In 2013, there were 138 cargo ships which were beyond repair or recovery, either from fire, collision, mechanical failure, or other type of accident, most became shipwrecks and now pollute an aquatic ecosystem. (493) How many thousands of other commercial ships and recreational watercraft have sunk over the last 500 years and still pollute the ocean, a river, lake, or other aquatic ecosystem, some even being ticking toxic time bombs waiting to release a toxic substance?

In an attempt to impede the growth of barnacles, algae, and other marine organisms, most watercraft are coated with anti-fouling paints which can contain cuprous oxide or other copper compounds, Teflon, silicon, and/or other highly toxic pesticides. During the 1960s and 1970s, commercial vessels commonly used bottom paints containing tributyltin, this highly toxic chemical had serious negative impacts on marine life, and it also led to the collapse of some French shellfish fisheries. How many billions of marine organisms have died as a result of using these toxic chemicals? Could not a more natural less toxic solution be developed and used instead? How many billions of non-target marine organisms have also perished as a result of these toxic anti-fouling paints? How many trillions of toxic microscopic particles from anti-fouling paints and other plastic fragments have flaked off watercraft and now pollute the oceans, lakes, or rivers?



SOURCE: NASA – “No fishing activity causes more physical and ecological “collateral damage” than bottom trawling. Fishing boats drag large nets across the sea floor, scooping up seafood from shrimp to squid. But in addition to their harvesting of intended species, many trawls indiscriminately capture non-target species, like sea turtles, which are discarded. Trawling crushes or destroys the seafloor habitat that feeds and shelters marine life; the nets literally scrape the mud off the ocean bottom. As the mud resettles, it can smother surviving bottom-dwelling creatures.

The pervasiveness of the influence of bottom trawlers on the Gulf of Mexico is evident in these images from NASA’s

Landsat satellite. Showing two different areas of a single scene captured on October 24, 1999, the images reveal dozens of mudtrails streaking the Gulf in the wake of numerous trawlers, which appear as white dots. The amount of re-suspended sediment dredged up by the trawlers gives the water a cloudy appearance.” - <https://visibleearth.nasa.gov/view.php?id=7751>

Each year tankers, cargo ships, cruise ships, navy ships, yachts, fishing boats, whale watching vessels, or other watercraft collide with whales, dolphins, sharks, seals, and other marine faunae and flora, some of them fatal and many of the collisions often going unnoticed or unreported. (376) Since 2007, the International Whaling Commission has been developing a global database of collisions between ships and whales, as of May 2016 the database contained more than 1,200 incidents. In 2005, billionaire Jeff Greene's luxury yacht *Summerwind* allegedly damaged a coral reef off the coast of Belize And although the incident was well documented but still denied, neither Greene or the captain were criminally charged, nor did they perform any reef restoration. (426) In January 2016, billionaire Paul Allen's super yacht '*Tatoosh*' damaged 13,000 square feet of a coral reef in the Cayman Islands. Allen had remediation work done to the reef reattaching more than 1,600 organisms in March 2016. (427) If passing ships have the potential to damage fragile and rare coral reefs, why are these areas not deemed a no-sailing zone? How many thousands of similar unreported incidents have possibly happened at coral reefs and in other fragile marine ecosystems throughout the world?

Dams

There are more than 57,000 dams worldwide which have flooded 154,440 square miles of once dry land, an area about the size of California. (208) When dams are built, ecosystems are disrupted and changed forever displacing and killing many species of flora and fauna, some even endemic. Dams change the ecology of an ecosystem affecting natural floodplains and waterways, while also creating a barrier between the upstream and downstream movements of migratory river faunae, especially fish species like salmon and trout. River sediment which creates deltas, alluvial fans, levees, and coastal shores is also disrupted when a river is dammed. *Homo sapiens* are also displaced causing disruption and excessive stress on resources of other areas which must accommodate new inhabitants. A recent example of this was the Three Gorges Dam in China which forced over 1,000,000 *Homo sapiens* to relocate. Dams also result in a possible loss of productive agricultural land area, archaeological sites, and natural wonders. Dam failure can potentially cause massive damage and result in loss of life, like the 1975 Banqiao Dam failure in China which killed more than 171,000 *Homo sapiens* and displaced 11,000,000 surviving residents. There are only enough water resources in an area to sustain a certain number of inhabitants, and this number is determinant as to what is available naturally in each type of ecosystem on Earth, some with more abundant water resources than others. Instead of attempting to change this and disrupt the regions ecology, would not the more logical solution be to have less inhabitants in the area and do less water consuming activities such as practicing agriculture in the desert? Are there not enough other natural sources like solar and wind to harness energy from, instead of creating massive ecologically disruptive dams?

Mineral Extraction

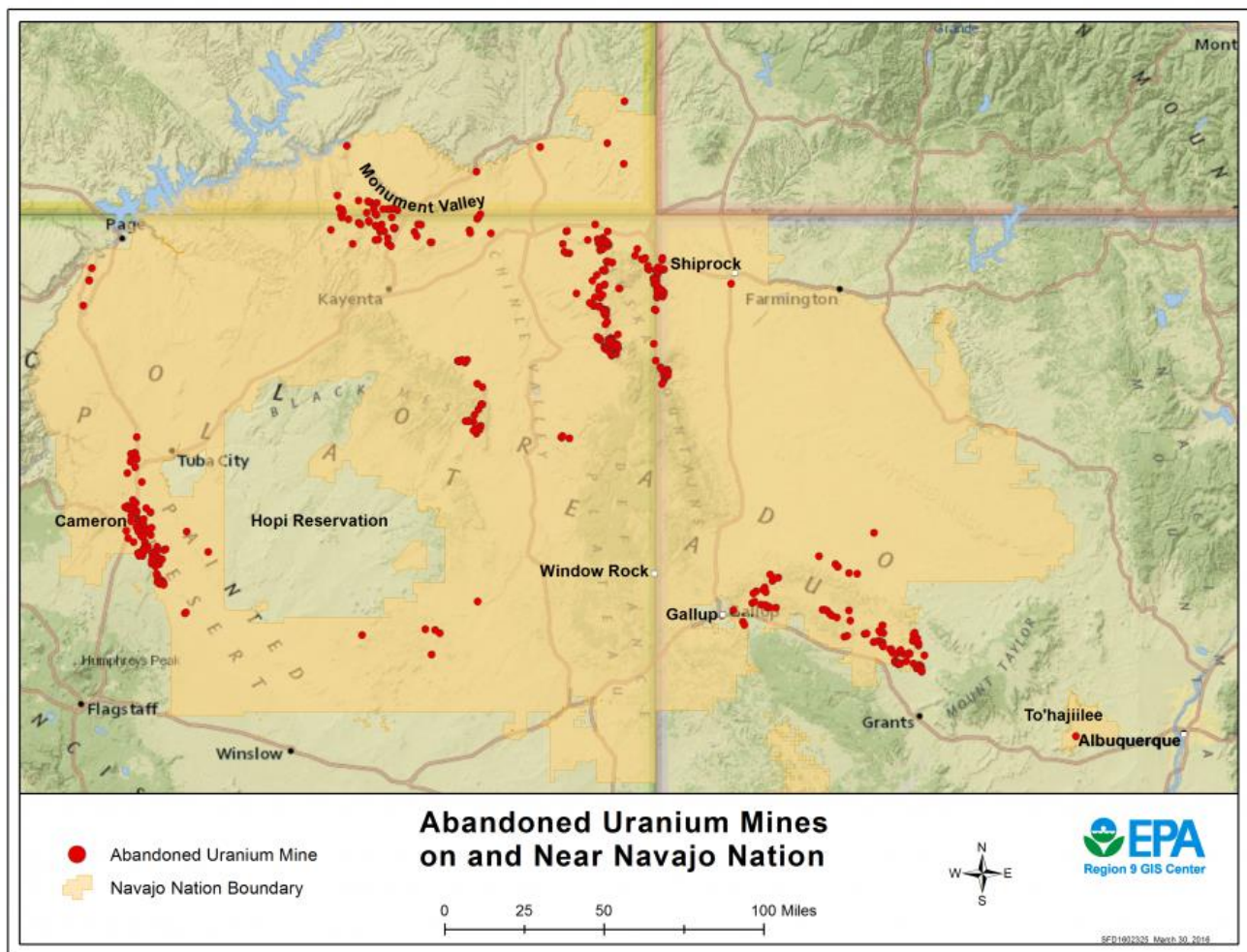
For thousands of years *Homo sapiens* have extracted, used, and disposed of improperly a variety of minerals, many of them toxic. These minerals, some of which are extremely toxic, were buried in the Earth for millions of years slowly being recycled by natural processes, and now they have been brought to Earth's surface potentially exposing all terrestrial lifeforms to their toxicity. In December 2016, between 3,000 and 4,000 migrating snow geese died from exposure to heavy metals and sulfuric acid when they landed in the toxic Berkeley Pit, a former open pit copper mine in Montana. (448) If birds die on contact with a body of water, is this not a sign that there should be even more strict environmental regulations and cleanup when mining? Should *Homo sapiens* be extracting vast amounts of lead, zinc, mercury, or other highly toxic chemicals to remain on the surface potentially contaminating the water, air, and soils? How many thousands of mines now have millions of gallons of toxic tailings leftover? Are *Homo sapiens* creating a cesspool of toxic waste to live in on Earth, and what consequence will there be to not only *Homo sapiens*, but to other life on Earth as well? Should not these highly toxic minerals be more conservatively used, if at all? How many millions of holes have been drilled into Earth to extract all of these minerals? There is already serious discussion about space mining and the potential to extracting minerals and other natural resources from outer space. What negative effects could this possibly have on Earth's ecosystems by adding vast quantities of additional cobalt, titanium, iron, nickel, platinum, or other

potentially unknown toxic elements to Earth?

Since *Homo sapiens* began working with mercury thousands of years ago, anthropogenic activities have released an estimated 350,000 tonnes of mercury onto Earth, with 39% being emitted before 1850 and 61% after 1850. (424) Some mercury has been intentionally dumped into the hydrosphere and lithosphere causing severe pollution, but the majority has been released into the atmosphere from the burning of coal and from the production of gold, cement, and steel. The Arctic tundra has also become a global sink for atmospheric mercury pollution resulting from coal burning and other anthropogenic activities which release mercury into the atmosphere. (406) This mercury depository slowly releases the mercury from the soils into the rivers, and ultimately it flows into the oceans. If the permafrost thaws as a result of global warming, will this release vast sums of mercury into the oceans and if so what effect will this have?

For thousands of years, materialistic views have led to the excessive mining of gold, diamonds, silver, copper, and other precious minerals to produce unnecessary and extravagant items like jewelry and other aesthetically appealing things. Historically through 2011, an estimated 171,300 metric tons of gold was mined, and currently 84,300 tons are held privately in the form of jewelry, 33,000 tons is held as an investment, 29,500 tons is held commercially by central banks as official stocks, 20,800 tons has been fabricated into other products, and the remaining 3,600 tons is unaccounted for. In 2017, an estimated 73% of the world's jewelry production was done by India, China, Italy, Turkey, the United States, and Russia. (496) How much environmental damage has been done mining for gold over the last 4,000 years, mostly for jewelry and mainly for materialism? How many millions of *Homo sapiens* have been killed or injured throughout history during the pursuit and fight over gold?

During the cold war, to supply the demand for United States nuclear weapons, the Navajo Nation in the western United States was so exploited for Uranium that homes and drinking water sources still today have elevated levels of radiation. Between 1944 and 1986, nearly 30,000,000 tons of uranium ore was extracted from Navajo lands leaving some 500 abandoned uranium mines (AUMs). The Environmental Protection Agency (EPA) has been working to resolve this toxic legacy since the 1990s, but progress has been extremely slow, as is often the case with environmental remediation done by the government. (642)



SOURCE: EPA - <https://www.epa.gov/navajo-nation-uranium-cleanup/cleaning-abandoned-uranium-mines>

Asbestos has been used by *Homo sapiens* for thousands of years, and although consumption peaked in 1973 at 804,000 tons after it was linked to asbestosis, mesothelioma, and lung cancer, it is still not banned in the United States and its use continues throughout the world with more than 2,000,000 tons being used in 2014. (446) In 2004, there were 107,000 deaths worldwide which were related to occupational exposure to asbestos. (447) A 2005 monograph by RAND Corporation found that the asbestos litigation was the longest-running mass tort litigation to date in United States history, and that through 2002 there have been 730,000 individuals that were exposed to asbestos and have brought claims against 8,400 business entities. They also found that \$70,000,000,000 was spent by defendants and insurers, with more than half of this money being consumed by the claimants' and defendants' litigation expenses. (539) Why is the use of asbestos still tolerated, why has it not been completely banned by the government? How many millions of metric tons of asbestos have been mined and now pollute the Earth? How many millions of tons of asbestos still insulate buildings waiting to be exposed in the future when being remodeled or demolished? How many millions of deaths have been caused by asbestos exposure? How many millions more could die as a result of future asbestos exposure?

During alumina production derived from bauxite, for each ton of metallic aluminum produced some 2 tons of toxic red mud are generated. This extremely toxic by-product which is very difficult to dispose of is toxic to most all living organisms. Each year, 30,000,000 tons of red mud are produced worldwide, consisting of alumina, iron oxide, titanium oxide, silica, calcium oxide, alkali, and other trace elements. (283)

2015 Global Mineral Commodity Production Statistics		
Mineral	World Production (Metric Tons / Dry Tons)	Recycling

	When Applicable) unless otherwise noted	
Fused aluminum oxide	1,290,000	Up to 30% of fused aluminum oxide may be recycled.
Silicon carbide	1,010,000	About 5% of silicon carbide is recycled.
Aluminum	58,300,000	In 2015, aluminum recovered from purchased scrap in the United States was about 3.61 million tons, of which about 54% came from new (manufacturing) scrap and 46% from old scrap (discarded aluminum products). Aluminum recovered from old scrap was equivalent to about 30% of apparent consumption.
Antimony	150,000	The bulk of secondary antimony is recovered at secondary lead smelters as antimonial lead, most of which was generated by, and then consumed by, the lead-acid battery industry.
Arsenic trioxide	36,000	Arsenic metal was recycled from GaAs semiconductor manufacturing. Arsenic contained in the process water at wood treatment plants where CCA was used was also recycled. Although electronic circuit boards, relays, and switches may contain arsenic, no arsenic was recovered from them during recycling to recover other contained metals. No arsenic was recovered domestically from arsenic-containing residues and dusts generated at nonferrous smelters in the United States.
Asbestos	2,000,000	None.
Alumina	118,000,000	None.
Bauxite	274,000,000	None.
Barite	7,460,000	None.
Beryllium	300	Beryllium was recovered from new scrap generated during the manufacture of beryllium products and from old scrap. Detailed data on the quantities of beryllium recycled are not available but may account for as much as 20% to 25% of total beryllium consumption. The leading U.S. beryllium producer established a comprehensive recycling program for all of its beryllium products, recovering approximately 40% of its new and old beryllium alloy scrap. Beryllium manufactured from recycled sources requires only 20% of the energy as that of beryllium manufactured from primary sources.
Bismuth	13,600	Bismuth-containing new and old alloy scrap was recycled and thought to compose less than 10% of U.S. bismuth consumption, or about 80 tons.
Boron	5,960,000	Insignificant.
Bromide	390,000	Some bromide solutions were recycled to obtain elemental bromine and to prevent the solutions from being disposed of as hazardous waste. Hydrogen bromide is emitted as a byproduct in many organic reactions. This byproduct waste is recycled with virgin bromine brines and is a source of bromine production. Plastics containing bromine flame retardants can be incinerated as solid organic waste, and the bromine can be recovered. This recycled bromine is not included in the virgin bromine production reported to the U.S. Geological Survey by companies but may be included in data collected by the U.S. Census Bureau.
Cadmium	24,200	Secondary cadmium is mainly recovered from spent consumer and industrial NiCd batteries. Other waste and scrap from which cadmium can be recovered includes copper-cadmium alloy scrap, some complex nonferrous alloy scrap, and cadmium-containing dust from electric arc furnaces (EAF). The amount of cadmium recovered from secondary sources in 2015 was withheld to avoid disclosing company proprietary data.
Cement	4,100,000,000	Cement kiln dust is routinely recycled to the kilns, which also can make use of a variety of waste fuels and recycled raw materials such as slags and fly ash. Various secondary materials can be incorporated as supplementary cementitious materials (SCMs) in blended cements and in the cement paste in concrete. Cement is not directly recycled, but significant quantities of concrete are recycled for use as construction aggregate.
Cesium	Unavailable	Consumption, import, and export data for cesium have not been available since the late 1980s. Because cesium metal is not traded in commercial quantities, a market price is unavailable. Only a few thousand kilograms of cesium are consumed in the United States every year. Cesium formate brines are typically rented by oil and gas exploration clients. After completion of the well, the used cesium formate brine is returned and reprocessed for subsequent drilling operations. Cesium formate production from Canada was estimated to be 5,630 tons per year, including 3,890 tons of cesium from 17,300 tons of pollucite ore. The formate brines are recycled with a recovery rate of 85%, which can be retrieved for further use.
Chromium	27,000,000	In 2015, recycled chromium (contained in reported stainless steel scrap receipts) accounted for 34% of apparent consumption.
(Clay) Bentonite	16,000,000	Insignificant.
(Clay) Fuller's earth	3,240,000	Insignificant.

(Clay) Kaolin	34,000,000	Insignificant.
Cobalt	124,000	In 2015, cobalt contained in purchased scrap represented an estimated 28% of cobalt reported consumption.
Copper	18,700,000	Old scrap, converted to refined metal and alloys, provided 160,000 tons of copper, equivalent to 9% of apparent consumption. Purchased new scrap, derived from fabricating operations, yielded 670,000 tons of contained copper. Of the total copper recovered from scrap (including aluminum- and nickel-base scrap), brass mills recovered 79%; copper smelters, refiners, and ingot makers, 15%; and miscellaneous manufacturers, foundries, and chemical plants, 6%. Copper in all scrap contributed about 32% of the U.S. copper supply.
Diamonds (industrial)	54,000,000 carats	In 2015, the amount of diamond bort, grit, and dust and powder recycled was estimated to be 37.8 million carats with an estimated value of \$27.4 million. It was estimated that 477,000 carats of diamond stone was recycled with an estimated value of \$1.36 million. Natural diamond accounts for about 1% of all industrial diamond used; synthetic diamond accounts for the remainder. At least 15 countries have the technology to produce synthetic diamond. In 2015, China was the world's leading producer of synthetic industrial diamond, with annual production exceeding 4 billion carats.
Diatomite	2,290,000	None.
Feldspar and nepheline syenite	21,200,000	Feldspar and nepheline syenite are not recycled by producers; however, glass container producers use cullet (recycled container glass), thereby reducing feldspar and nepheline syenite consumption.
Fluorspar	6,250,000	A few thousand tons per year of synthetic fluorspar are recovered—primarily from uranium enrichment, but also from petroleum alkylation and stainless steel pickling. Primary aluminum producers recycle HF and fluorides from smelting operations. HF is recycled in the petroleum alkylation process.
Gallium	435	Old scrap, none. Substantial quantities of new scrap generated in the manufacture of GaAs-based devices were reprocessed to recover high-purity gallium at one facility in Utah
Garnet (industrial)	1,660,000	Small quantities of garnet reportedly are recycled.
Germanium	165,500 kilograms	Worldwide, about 30% of the total germanium consumed is produced from recycled materials. During the manufacture of most optical devices, more than 60% of the germanium metal used is routinely recycled as new scrap. Germanium scrap is also recovered from the window blanks in decommissioned tanks and other military vehicles.
Gold	3,000	In 2015, 140 tons of new and old scrap was recycled, slightly less than the reported consumption. Following the decline in price, the domestic and global supply of gold from recycling continued to decline from the high level in 2011.
Graphite (Natural)	1,190,000	Refractory brick and linings, alumina-graphite refractories for continuous metal castings, magnesiagraphite refractory brick for basic oxygen and electric arc furnaces, and insulation brick were the leading sources of recycled graphite products. The market for recycled refractory graphite material is growing, with material being reused in products such as brake linings and thermal insulation. Recovering high-quality flake graphite from steelmaking kish, a mixture of graphite, desulfurization slag, and iron, is technically feasible, but not practiced at the present time because it is not economical. The abundance of graphite in the world market inhibits increased recycling efforts. Information on the quantity and value of recycled graphite is not available.
Gypsum	258,000,000	Some of the more than 4 million tons of gypsum scrap that was generated by wallboard manufacturing, wallboard installation, and building demolition was recycled. The recycled gypsum was used primarily for agricultural purposes and feedstock for the manufacture of new wallboard. Other potential markets for recycled gypsum include athletic field marking, cement production as a stucco additive, grease absorption, sludge drying, and water treatment.
Helium	168,000,000 cubic meters	In the United States, helium used in large-volume applications is seldom recycled. Some low-volume or liquid boil-off recovery systems are used. In the rest of the world, helium recycling is practiced more often.
Indium	755	Data on the quantity of secondary indium recovered from scrap were not available. Indium is most commonly recovered from ITO scrap in Japan and the Republic of Korea. A small quantity of scrap was recycled domestically.
Iodine	30,300	Small amounts of iodine were recycled, but no data were reported.
Iron and Steel	1,180,000,000 Pig Iron 1,640,000,000 Raw Steel	Recycled iron and steel scrap is a vital raw material for the production of new steel and cast iron products. The steel and foundry industries in the United States have been structured to recycle scrap, and, as a result, are highly dependent upon scrap. In the United States, the primary source of old steel scrap was the automobile. The recycling rate for automobiles in 2013, the latest year for which statistics were available, was about 85%. In 2013, the automotive recycling industry recycled more than 14 million tons of

		steel from end-of-life vehicles through more than 300 car shredders, the equivalent of nearly 12 million automobiles. More than 7,000 vehicle dismantlers throughout North America resell parts. The recycling rates for appliances and steel cans in 2013 were 82% and 70%, respectively; this was the latest year for which statistics were available. Recycling rates for construction materials in 2013 were, as in 2012, about 98% for plates and beams and 72% for rebar and other materials. The recycling rates for appliance, can, and construction steel are expected to increase not only in the United States, but also in emerging industrial countries at an even greater rate.
Iron Ore	3,320,000,000	None.
Kyanite and related minerals	420,000	Insignificant.
Lead	4,710,000	In 2015, about 1.12 million tons of secondary lead was produced, an amount equivalent to 69% of apparent domestic consumption. Nearly all secondary lead was recovered from old (post-consumer) scrap.
Lime	350,000,000	Large quantities of lime are regenerated by paper mills. Some municipal water-treatment plants regenerate lime from softening sludge. Quicklime is regenerated from waste hydrated lime in the carbide industry. Data for these sources were not included as production in order to avoid duplication
Lithium	32,500	Historically, lithium recycling has been insignificant but has increased steadily owing to the growth in consumption of lithium batteries. One U.S. company has recycled lithium metal and lithium-ion batteries since 1992 at its facility in British Columbia, Canada. In 2009, the U.S. Department of Energy awarded the company \$9.5 million to construct the first U.S. recycling facility for lithium-ion vehicle batteries. Construction neared completion in 2015. Lithium consumption for batteries has increased significantly in recent years because rechargeable lithium batteries are used extensively in the growing market for portable electronic devices and increasingly are used in electric tools, electric vehicles, and grid storage applications. There are an estimated 14,000,000 metric tons of known lithium reserves worldwide.
Magnesium compounds	8,300,000	Some magnesia-based refractories are recycled, either for reuse as refractory material or for use as construction aggregate.
Magnesium metal	910,000	In 2015, about 25,000 tons of secondary magnesium was recovered from old scrap and 55,000 tons were recovered from new scrap. Aluminum-base alloys accounted for 77% of the secondary magnesium recovered. Magnesium chloride produced as a waste product of titanium sponge production at a plant in Utah is returned to the primary magnesium supplier where it is reduced to produce metallic magnesium; however, this metal is not included in the secondary magnesium statistics.
Manganese	18,000,000	Manganese was recycled incidentally as a constituent of ferrous and nonferrous scrap; however, scrap recovery specifically for manganese was negligible. Manganese is recovered along with iron from steel slag.
Mercury	2,340	In 2015, six companies in the United States accounted for the majority of secondary mercury production. Mercury-containing automobile convenience switches, barometers, compact and traditional fluorescent lamps, computers, dental amalgam, medical devices, thermostats, and some mercury-containing toys were collected by as many as 50 smaller companies and shipped to the refining companies for retorting to reclaim the mercury. In addition, many collection companies recovered mercury when retorting was not required. The increased use of mercury substitutes has resulted in a shrinking reservoir of mercury-containing products for recycling. Minimizing the use of mercury in products that still require mercury has further reduced the amount of secondary mercury available for recovery.
Mica (natural)	1,120,000	None.
Molybdenum	267,000	Molybdenum is recycled as a component of catalysts, ferrous scrap, and superalloy scrap. Ferrous scrap comprises revert scrap, and new and old scrap. Revert scrap refers to remnants manufactured in the steelmaking process. New scrap is generated by steel mill customers and recycled by scrap collectors and processors. Old scrap is largely molybdenum-bearing alloys recycled after serving their useful life. The amount of molybdenum recycled as part of new and old steel and other scrap may be as much as 30% of the apparent supply of molybdenum. There are no processes for the separate recovery and refining of secondary molybdenum from its alloys. Molybdenum is not recovered separately from recycled steel and superalloys, but the molybdenum content of the recycled alloys is significant, and the molybdenum content is reused. Recycling of molybdenum-bearing scrap will continue to be dependent on the markets for the principal alloy metals of the alloys in which molybdenum is found, such as iron, nickel, and chromium.
Nickel	2,530,000	In 2015, 101,900 tons of nickel was recovered from purchased scrap in 2015. This

		represented about 45% of reported secondary plus apparent primary consumption for the year.
Niobium	56,000	Niobium was recycled when niobium-bearing steels and superalloys were recycled; scrap recovery specifically for niobium content was negligible. The amount of niobium recycled is not available, but it may be as much as 20% of apparent consumption.
Nitrogen (fixed) Ammonia	146,000,000	None.
Peat	27,600,000	None.
Perlite	2,680,000	Not available.
Phosphate rock	223,000,000	None.
Platinum-group metals Platinum, palladium, rhodium, ruthenium, iridium, osmium	178,000 kilograms Platinum 208,000 kilograms Palladium	An estimated 125,000 kilograms of platinum, palladium, and rhodium was recovered globally from new and old scrap in 2015, including about 55,000 kilograms recovered from automobile catalytic converters in the United States.
Potash	38,800,000	None.
Pumice and pumicite	17,200,000	Not Available.
Quartz crystal (industrial)	Unavailable	An unspecified amount of rejected cultured quartz crystal was used as feed material for the production of cultured quartz crystal.
Rare earths	124,000	Limited quantities, from batteries, permanent magnets, and fluorescent lamps.
Rhenium	46,000 kilograms	Nickel-based superalloy scrap and scrapped turbine blades and vanes continued to be recycled hydrometallurgically to produce rhenium metal for use in new superalloy melts. The scrapped parts were also processed to generate engine revert—a high-quality, lower cost superalloy meltstock—by a growing number of companies, mainly in the United States, Canada, Estonia, Germany, and Russia. Rhenium-containing catalysts were also recycled.
Rubidium	80,000	None.
Salt	273,000,000	None.
Sand and gravel (construction)	931,000,000 (United States only World total unavailable)	Recycling of asphalt road surface layers, cement concrete surface layers, and concrete structures was increasing, although it was still a small percentage of aggregates consumption.
Sand and gravel (industrial)	181,000,000	Some foundry sand is recycled, and recycled cullet (pieces of glass) represents a significant proportion of reused silica. About 34% of glass containers are recycled.
Scandium	Unavailable	None.
Selenium	2,340 (World total excluding United States)	Domestic production of secondary selenium was estimated to be very small because most scrap from older plain paper photocopiers and electronic materials was exported for recovery of the contained selenium.
Silicon	8,100,000	Insignificant.
Silver	27,300	In 2015, approximately 1,200 tons of silver was recovered from new and old scrap, about 15% of apparent consumption.
Soda ash	51,700,00	No soda ash was recycled by producers; however, glass container producers are using cullet glass, thereby reducing soda ash consumption.
Stone (crushed)	1,320,000,000 (United States only World total unavailable)	Road surfaces made of asphalt and crushed stone and portland cement concrete surface layers and structures were recycled on a limited but increasing basis in most States. Asphalt road surfaces and concrete were recycled in all 50 States. The amount of material reported to be recycled increased by 3% in 2015 compared with that of the previous year.
Stone (dimension)	2,510,000	Small amounts of dimension stone were recycled, principally by restorers of old stone work.
Strontium	320,000	None.
Sulfur	70,100,000	Typically, between 2.5 million and 5 million tons of spent sulfuric acid is reclaimed from petroleum refining and chemical processes during any given year.
Talc and pyrophyllite	7,320,000	Insignificant.
Tantalum	1,200	Tantalum was recycled mostly from new scrap that was generated during the manufacture of tantalum-containing electronic components and from tantalum-containing cemented carbide and superalloy scrap.
Tellurium	120 (World total excluding United States)	For traditional metallurgical and chemical uses, there was little or no old scrap from which to extract secondary tellurium because these uses of tellurium are highly dispersive or dissipative. A very small amount of tellurium was recovered from scrapped selenium-tellurium photoreceptors employed in older plain paper copiers in Europe. A plant in the

		United States recycled tellurium from CdTe solar cells; however, the amount recycled was limited, because CdTe solar cells were relatively new and had not reached the end of their useful life.
Thallium	less than 10,000 kilograms	None.
Thorium	Unavailable	None.
Tin	294,000	About 12,600 tons of tin from old and new scrap was recycled in 2015 accounting for about 30% of apparent consumption. Of this, about 10,600 tons was recovered from old scrap at 2 detinning plants and about 75 secondary nonferrous metal-processing plants.
Titanium and titanium dioxide	171,000	About 51,000 tons of scrap metal was recycled by the titanium industry in 2015. Estimated use of titanium scrap by the steel industry was about 10,200 tons; by the superalloy industry, 500 tons; and by other industries, 1,200 tons.
Titanium mineral concentrates	Ilmenite 5,610,000 Rutile 6,090,000	None.
Tungsten	87,000	In 2015, the estimated tungsten contained in scrap consumed by processors and end users represented 59% of apparent consumption of tungsten in all forms.
Vanadium	79,400	The quantity of vanadium recycled from spent chemical process catalysts was significant and may compose as much as 40% of total vanadium catalysts. Some tool steel scrap was recycled primarily for its vanadium content but this only accounted for a small percentage of total vanadium used.
Vermiculite	408,000	Insignificant.
Wollastonite	550,000	None.
Yttrium	8,000 – 10,000	Small quantities, primarily from phosphors.
Zeolites (natural)	2,780,000	Zeolites used for desiccation, gas absorbance, wastewater cleanup, and water purification may be reused after reprocessing of the spent zeolites. Information about the quantity of recycled natural zeolites was unavailable.
Zinc	13,400,000	In 2015, about 37% (65,000 tons) of the refined zinc produced in the United States was recovered from secondary materials at both primary and secondary smelters. Secondary materials included galvanizing residues and crude zinc oxide recovered from electric arc furnace dust.
Zirconium and hafnium	1,410	Companies in Oregon and Utah recycled zirconium from new scrap generated during metal production and fabrication and/or from post-commercial old scrap. Zircon foundry mold cores and spent or rejected zirconia refractories are often recycled. Hafnium metal recycling was insignificant.
SOURCE: USGS 2016 USGS Mineral Commodity Summaries ISBN 978-1-4113-4011-4 - https://minerals.usgs.gov/minerals/pubs/mcs/2016/mcs2016.pdf		

Fossil Fuels

Fossil fuels (oil, natural gas, and coal) are carbon that was removed from Earth's carbon cycle millions of years ago, this natural carbon sequestration process balances all the carbon on Earth by slowly releasing the carbon over millions of more years, versus rapidly releasing it back into the environment when it is used as a fuel like *Homo sapiens* have done over the last 200 years. Continuing to use oil, natural gas and coal will only further release more stored carbon into the Earth's delicately balanced equilibrium formula, and only cause more environmental damage. In every stage of fossil fuel use, be it the extraction, processing, or consumption phase, there are negative environmental impacts. Pollution is caused in every sphere of Earth, and as a result of fossil fuel consumption the air, water, and soil have all been negatively impacted to some degree. Fossil fuel use should not be cutback so that greenhouse gas emissions can be maintained at a so called acceptable level, fossil fuel use should be eliminated entirely, as it is toxic to the Earth in all forms. Fossil fuels and other toxic minerals are buried within Earth for a reason, they are toxic to Earth's surface and to most all living organisms on Earth, including *Homo sapiens*. No lifeform is naturally made with them, nor does any other species utilize them to facilitate their existence except *Homo sapiens*.

Since 1751, more than 337,000,000,000 metric tonnes of carbon have been released into Earth's atmosphere from the consumption of fossil fuels and cement production, with half of these emissions having been emitted since the mid-1970s. (179) Richard Heede did an 8-year study on carbon dioxide emissions and the companies which were responsible for those emission. He concluded that almost 2/3 of carbon dioxide emitted since the 1750s were from the 90 largest fossil fuel and cement producers, most of which are still conducting operations to this day. Heede's research also attributes 63% of the carbon dioxide and methane emissions between 1751 and

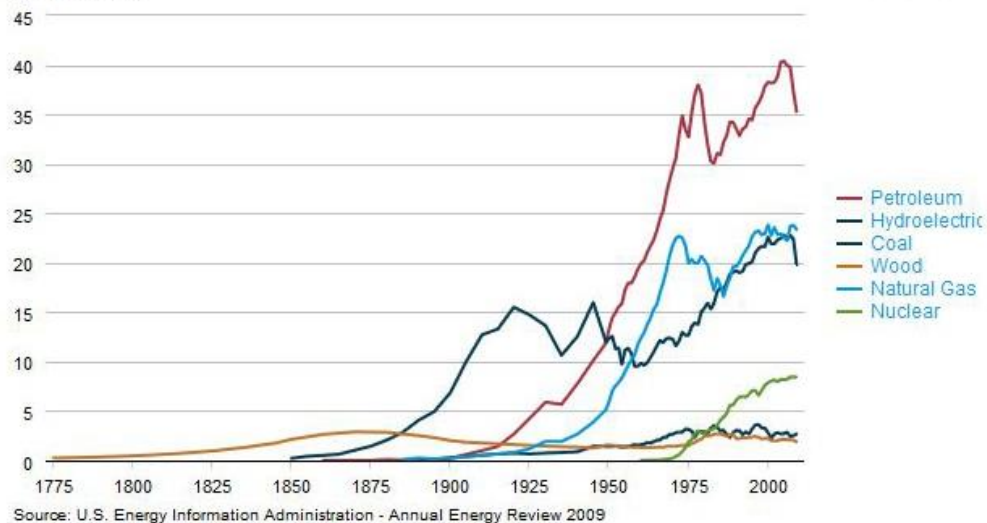
2010 to just 90 entities aka the '*Carbon Majors*'. In total, Heede's research investigated 56 oil and natural gas companies, 37 coal producers, and the carbon dioxide emissions from 7 cement manufacturers. (174)

FEBRUARY 9, 2011

History of energy consumption in the United States, 1775–2009

History of energy consumption in the United States, 1775-2009

quadrillion Btu



SOURCE: EIA - <https://www.eia.gov/todayinenergy/detail.php?id=10>

Most societies today have a severe addiction to fossil fuels and have developed a dependency on it, nearly everything is linked to it in some form, be it the materials, energy generation, or transportation. Petroleum is most commonly associated with oil and gasoline which is used in automobiles, but in addition to supplying fuel for transportation and as an energy source, petroleum is used to create a wide range of plastics, lubricants, motor oil, machine oils, tar, asphalt, synthetic rubbers, fertilizers, dyes, insecticides, solvents, detergents, and many other everyday products used by consumers. When most of these toxic products are made the processes used to create the desired product will also create a toxic by-product, this by-product or waste must also be dealt with can potentially causes even more pollution.

Oil and other Transportation Fuels

In most areas of the United States, shared transportation, (e.g. buses, subways, trains, taxis, etc.) are not utilized by the majority of citizens and most do not walk or ride bicycles to get to their destination either, but instead drive automobiles. How many automobiles are just sitting most of the time parked, when they could be shared and utilized by all? Perhaps automobiles in the future will not be owned by individuals but will be more like a form of shared community transportation, a fleet of self-driving automobiles which all have access to. The World Health Organization reported that there were 1,250,000 road traffic deaths globally in 2013. (597) In November 2017, a driver in Virginia hit a bobcat, the driver didn't stop, but rather continued to her destination 50 miles away only to later find the bobcat still alive and lodged in the grill of the automobile. The bobcat suffered head trauma, a minor cut on the back, and no doubt psychological trauma, but wildlife officials said they planned to release it back into the wild once it had fully recovered in about a month. (603) How many millions of deer,

moose, rabbits, snakes, racoons, opossums, birds, insects, and other faunae are injured or killed by automobiles every year? Will autonomous vehicles reduce or perhaps even eliminate vehicle fatalities and even other non-fatal vehicle accidents?

Gasoline is one of the most inefficient automobile fuel sources, as up to 70% of the energy produced is wasted and emitted in the form of exhaust heat. The VW Beetle manufactured between 1938 and 2006 is an example of an automobile that has polluted the atmosphere for more than 65 years and continues to pollute long after emissions were set up and mandatory in most countries around the world. Currently, in the United States, antique or classic automobiles are exempt from emission standards, will they always be allowed to pollute the Earth because they are historic? Automobile fuel efficiency begins to decline once 55 mph (89 kph) is reached, so why even make an automobile that can travel faster than this, unless it is for emergency purposes? (e.g. fire, medical, police, etc.) During the conversion to electric vehicles, how many of the billions of gasoline and diesel automobiles that have already been made will perhaps remain on the roads for the next 50 years or more polluting the Earth? How long will it take for poorer less developed nations to convert over to electric vehicles? When will gasoline become obsolete and unavailable like whale oil and other fuels of the past?

In 2016, the world consumed 3,990,000,000 gallons of oil per day, which added up to an annual consumption of 145,635,000,000,000 gallons. (180) Between 1950 and 2013, the world manufactured around 1,105,764,000 gasoline or diesel-based passenger automobiles and light commercial vehicles. (e.g. pickup trucks and vans) This total does not include the millions of additional military vehicles, tractor trailers, buses, recreational vehicles, and other commercial vehicles in service. Between 1978 and 2014, 9,312,700 recreational vehicles were manufactured in the United States. (201) These millions of off highway vehicles (OHV) often operate in U.S. National Forests, State Parks, and other remote ecosystems contributing directly to invasive species, erosion, pollution, litter, and noise pollution. In 2014, there were nearly 11,000,000 registered semi-trucks in the United States, a 3% increase from the previous year. (282) Most of these semi-trucks are fueled by dirtier diesel fuel, and only get around 6.5 miles per gallon. Many semi-truck drivers sleep in their trucks with it running, as it is less expensive than a hotel room. If a semi-truck burns on average around 1 gallon of fuel when idling, how many millions of gallons of diesel fuel are burned in all the millions of semi-trucks every day just while idling? Why don't transportation companies pay for drivers lodging to prevent this unnecessary waste of fuel and pollution of the environment?

In 2012, there were 111,289,906 registered vehicles in the United States, most of them gasoline powered, compared with only 2,893,450 hybrid automobiles sold in the United States between 2000 and 2013. (88) Some automobile manufacturers are ramping up production on electric vehicles, Volvo announced that by 2019 all the automobiles it will produce will be either hybrid or 100% electrically powered, (407) and GM announced that it plans to add 20 all-electric models by 2023. (547) Some other automobile manufacturers are also currently offering or plan on adding at least one electric or hybrid model, and while the new all electric vehicle company Tesla sold 76,230 electric automobiles in 2016, it is a very miniscule amount compared with 1,105,764,000 gasoline or diesel-based automobiles which have been produced. (408) How long will it take for every driver of a fossil fuel powered automobile to convert to an all-electric automobile? Will governments around the world enact environmental legislation which prohibit the future production and use of all gasoline and diesel vehicles? If gas prices remain low, will this make consumers switching to an electric automobile take even longer, as many consumers seem to be more motivated by money and not about reducing their carbon footprint?

The first electric automobile was invented by Robert Davidson in 1837, and yet in 2017 only 777,497 electric automobiles were sold worldwide. (349) The technology has been in existence for 180 years, but the conversion to electric automobiles has been done at a very slow pace, and with much reluctance from not only the automobile industries, but by many consumers also. Knowing that gasoline automobiles have been a major source of carbon dioxide emissions for more than 50 years, why has so little been done to curb emissions, convert to electric automobiles, and setup a more reliable vast public transportation network of electric trains and buses? General Motors and other companies purposely derailed electric transportation since its inception, from the '*General Motors Streetcar Conspiracy*' between 1938 and 1950, to the termination of the EV1 in 1999. Jim Klein's 1996 documentary '*Taken for a Ride*' and Chris Paine's 2006 documentary '*Who Killed the Electric Car?*'

both give a detailed history on how early electric transportation was obstructed.

A fact which is often overlooked, is that unless all future land, sea, air, and space vehicles are independently solar powered, converting to electric vehicles will also require a significant increase in electricity generation in order to fuel these vehicles. This will not only place stress on worldwide electricity infrastructures, but would also increase pollution from these sources, thus making the conversion pointless unless electricity infrastructures are first converted to 100% renewable energy sources like solar and wind. Another point to consider are the vast amounts of resources which will need to be mined to create the billions of batteries. What will be the environmental consequences of extracting the vast amounts of lithium, nickel, cobalt, and manganese to manufacture the billions of lithium-ion batteries for the newly emerging electric transportation industry? Will another less toxic substance like molten salt or another innovation be used to store thermal energy in the future? Perhaps other future technologies which have even less environmental impacts than electric vehicles will be further developed, like compressed air automobiles. The Sun has abundant and endless energy radiating down on Earth, if development resources in the future are focused on improving solar panel technology, perhaps the solar panel alone would power everything from a cellphone to a rocket with no thermal storage needed. Batteries and charging systems not only pollute, but they can be made into another commodity which a corporation can make money from, as they have with coal and oil. If every electric device, all transportation, and every home were power independent, requiring only a third party for repairs, how much less polluted would the world be and how much money would the world save?

The future of transportation appears to be slow at starting to the conversion of electric vehicles, but it appears that eventually a total conversion towards not only electric, but also autonomous vehicles from automobiles to airplanes will occur. The first manned free flight by an electrically powered airplane was made in 1973, and in 2016 the '*Solar Impulse 2*' was the first piloted fixed-wing aircraft using only solar power to circumnavigate the Earth. And while most modern-day electrical aircraft are only experimental demonstrators, the future of aviation is rapidly undergoing major design changes with electrical power upgrades. Airbus is developing the E-Fan X, a hybrid-electric airliner, with Rolls-Royce and Siemens which is expected to fly in 2020. In September 2017, EasyJet announced it had also started developing a 180-seat electric airliner with Wright Electric that is forecasted to be operational by 2027. NASA has the X-57 Maxwell experimental aircraft which aims to reduce fuel use, emissions, and noise. In addition, NASA has the Puffin Project which is another technology-concept proprotor aircraft that has been proposed and would be a personal vertical takeoff and landing (VTOL) which would have hover-capabilities, be electrically-powered, and have low-noise. How long will it take until all aircraft are 100% electric, perhaps 100 years or more?

In 2016, there were more than 416,000 general aviation helicopters, airplanes, and other aircraft flying in the world, (e.g. aircraft for personal and recreational use, business, flight instruction, aeromedical, etc.) (566), in addition to the 29,730 military aircraft and attack helicopters mentioned in the previous chapter. In 2014, there were 37,960,000 flights worldwide, airlines carried more than 3,000,000,000 passengers, and shipping companies transported more than 50,000,000 tonnes of freight by aircraft. (571) Depending on the fuel type, an aircraft can emit large quantities of carbon dioxide, carbon monoxide, nitrogen oxides, black carbon, sulfur oxides, and tetraethyllead from piston aircraft engines. Aircraft noise receives very little attention and has been accepted as just another city noise even though it can cause annoyance, stress, hearing impairment, hypertension, sleep disturbance, and other negative health impact. Although the subject has been studied very little, contrails produced by aircraft do affect the cloudiness of the Earth's atmosphere, which in turn might affect the atmospheric temperature and climate of Earth. Observations from 1971 to 1995, showed that cirrus cloud cover increased significantly in some areas, while decreasing in other areas because of contrails produced from air traffic. (318) These cirrus clouds formed by contrails are capable of increasing average surface temperatures, and they are thought to be responsible for the warming trend between 1975 and 1994. (319) Beginning in the 1920s, Tetraethyllead was added to gasoline, but was phased out in most parts of the world when it was found to be accumulating in the atmosphere, soils, and in the population. As of 2017, Tetraethyllead was still being added to automobile fuels in Yemen, Iraq, and Algeria while also still being widely used in avgas aviation fuels for more than 300,000 piston powered aircraft around the world.

More than 5,000 rockets have been launched from Earth consuming millions of gallons of rocket fuel. When burned, these vast amounts of rocket fuel pollute and can even destroy the atmosphere and rain down large quantities of microscopic soot onto the Earth. There are little to no emission controls or other environmental impact standards set by governments in regard to rocket launches, which are done by the government itself and now by private companies joining the new space race. Between 1967 and 1973, NASA launched 13 Saturn V rocket's, the tallest, heaviest, and most powerful rockets ever launched into space. In total all 13 rockets consumed 2,644,200 gallons of kerosene fuel and 4,134,000 gallons of liquid oxygen. Modern-day rocket fuels consist of chemicals like liquid oxygen, nitrogen tetroxide, liquid hydrogen, hydrogen peroxide, hydrazine, nitrous oxide, and a range of other chemicals. Some rocket fuels also deplete the ozone, solid rocket fuels contain aluminum, ammonium perchlorate, and a polymer matrix, which when combusted gives rise to chlorine. The SpaceX Falcon 9 rocket launched in 2017, was so powerful that it generated the first known circular acoustic shock wave which created an enormous 900-kilometer-wide hole in the ionosphere of Earth's upper atmosphere, and possibly caused a temporary disruption to Global Positioning System (GPS) navigation. (4)

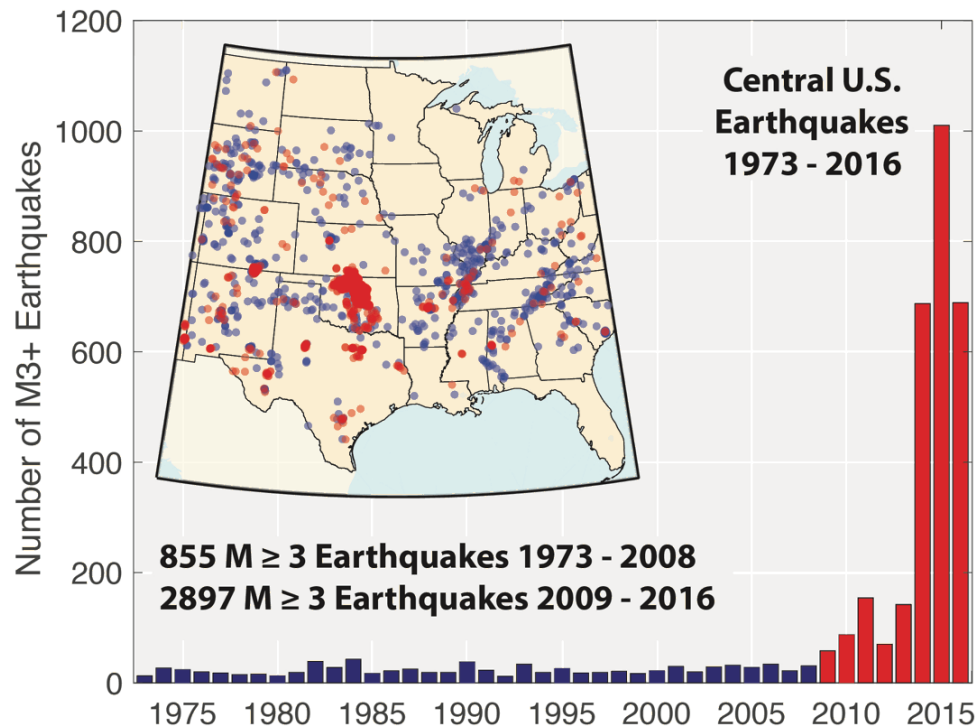
Natural Gas and Hydraulic Fracturing

For nearly 200 years, natural gas has been extracted from the Earth and it is now widely used to manufacture fabrics, glass, steel, plastics, paint, and other products, as a transportation fuel source, for domestic heating and cooking, power generation, and as a major feedstock for the production of ammonia used in fertilizer production. In 2014, the world consumed an estimated 3,560,000,000,000 cubic meters of natural gas. (643) Natural gas is often promoted as a clean renewable energy, but in reality, atmospheric methane is a more potent greenhouse gas in that it is more efficient at trapping heat in the atmosphere. In addition to emitting carbon dioxide, natural gas also contains carbon monoxide, sulfur dioxide, nitrogen oxides, particulates, and mercury. It also takes vast resources to extract natural gas, and like oil it is a very dangerous and potentially deadly fuel source. Gas is highly explosive and toxic to organic lifeforms if inhaled directly or when burned because of carbon monoxide poisoning. How much natural gas leaks out of old pipes before it even reaches the building for consumption? Why invest billions of dollars into a deadly and finite energy source which is not clean, but only pollutes the Earth?

Hydraulic fracturing is the process of releasing stored natural gas by injecting water, sand, and a plethora of chemicals into the shale layer at an extremely high pressure. A variety of proppants and other substances are used during the fracking process, some of which may also be toxic, these fracturing fluid chemicals and wastewater have the potential to contaminate the nearby soil, air, and water with leakage and spillage sometimes occurring during truck transport, the injection of the wells, and when the tainted water is in storage tanks and holding pits. Between 1,200,000 and 5,000,000 gallons of water may be consumed during the process of hydraulically fracturing a gas well. The USGS estimates that 60% to 80% of injected water returns to the surface as '*flowback*', with an estimated 15,000 gallons of chemicals in the waste water per 3,000,000 gallons of injected water. In 2015, the U.S. Environmental Protection Agency identified 692 unique ingredients in the hydraulic fracturing fluids used between January 2011 and February 2013, with some of the most frequently used chemicals being methanol, isopropanol, glutaraldehyde, potassiumhydroxide, sodium hydroxide, ethylene glycol, and peroxydisulfuric acid. (527) When present, this wastewater also brings naturally occurring radioactive materials (NORM), like radium, radon, and uranium to the surface potentially allowing exposure to deadly elements which were once safely buried within the Earth. (524) The Energy Policy Act of 2005 exempted fluids used in hydraulic fracturing from the Clean Air Act, Clean Water Act, Safe Drinking Water Act, and CERCLA. What is the point of having environmental regulations meant to safeguard the Earth like the Clean Air Act, Clean Water Act, Safe Drinking Water Act, and CERCLA if exemptions are given?

Since the early 1950's, it is estimated that more than 2,500,000 frack jobs have been pumped worldwide, with more than 1,000,000 having been done in the United States. (525) If each of these frack jobs used an average of 10,000 gallons of added chemicals, the total would equal 25,000,000,000 gallons of toxic chemicals used. Fracking has also been linked to a dramatic increase in the number of earthquakes. Between 1973 and 2008, there was an average of 21 M3+ earthquakes in the central and eastern United States, this rate increased to more than 600 M3+ earthquakes in 2014, more than 1,000 M3+ earthquakes in 2015, and more than 500 M3+

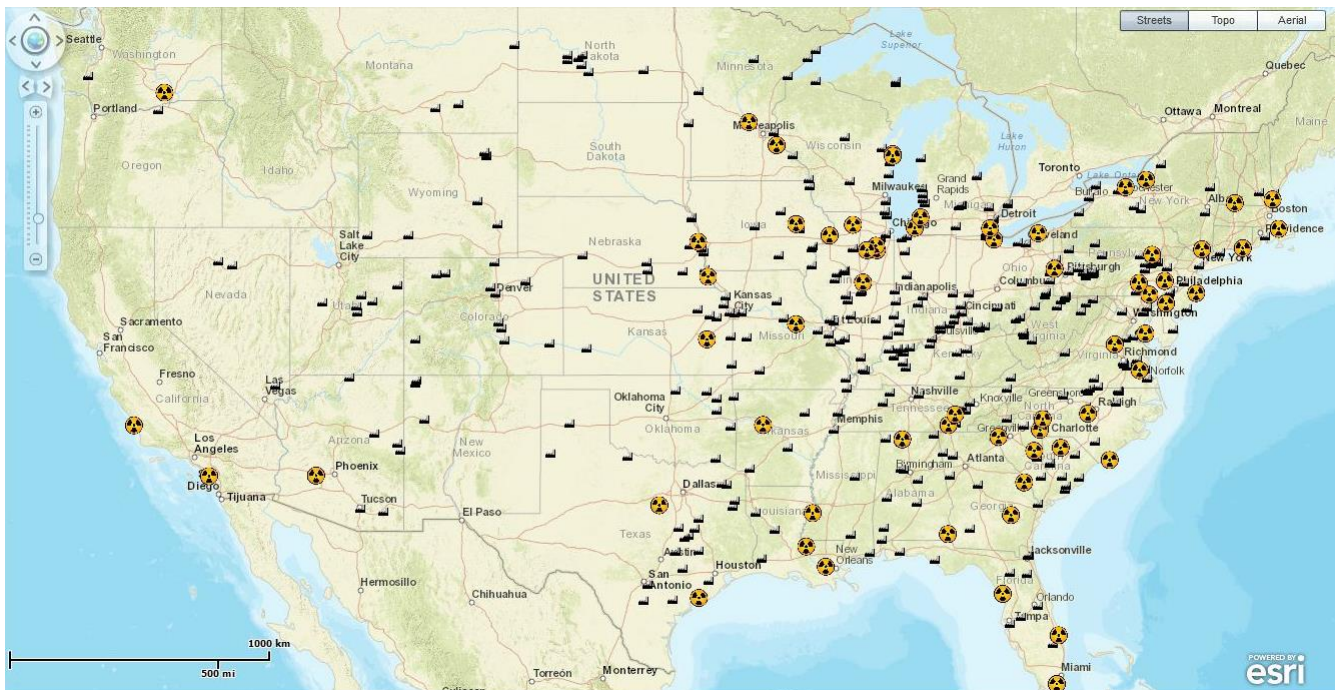
earthquakes between January and August 2016. (526) The documentary films, '*Gasland*' and '*Gasland Part II*' by: Josh Fox 2010 and 2013, show the negative impacts that fracking it is having on nearby communities.



SOURCE: USGS - Cumulative number of earthquakes with a magnitude of 3.0 or larger in the central and eastern United States, 1973–2016. The long-term rate of approximately 29 earthquakes per year increased sharply starting around 2009.

Coal

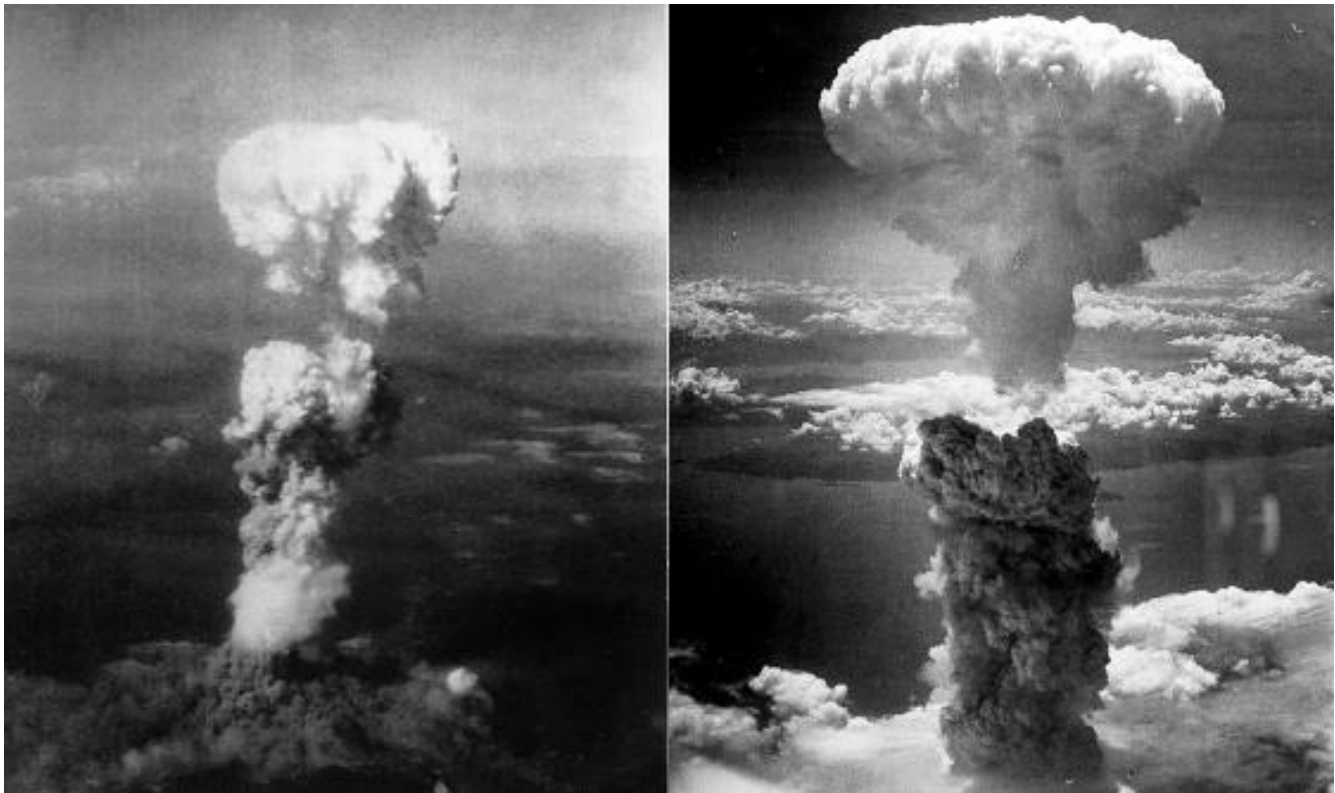
For thousands of years *Homo sapiens* have extracted coal from the Earth to use mainly as an energy source. Global coal production has been around 9,000,000,000 short tons each year since around 2012. (644) At this consumption rate and with estimated world coal reserves around 948,000,000,000 short tons, it would take around 100 more years before coal resources would be fully depleted. Not only is coal a finite resource, it is also an extremely dirty energy source producing a toxic concoction of carbon dioxide, sulfur dioxide (which causes acid rain), nickel, arsenic, mercury, vanadium, cadmium, barium, chromium, uranium, thorium, copper, molybdenum, zinc, lead, selenium and radium, beryllium, and black carbon. The burning of coal leads to vast amounts of a toxic radioactive by-product known as fly ash, with about 125,000,000 tons being produced in the United States alone in 2006, of which about 43% was recycled for commercial purposes, and the remainder went into landfills. (645) Worldwide there are thousands of coal seam fires beneath the Earth's surface burning an estimated 20,000,000 to 200,000,000 tons of coal each year. Some of these abandoned coal mines have been burning for more than 100 years, and towns like Centralia, Pennsylvania are no longer habitable as a result of coal seam fires. In addition, thousands of other coal seam fires were started in places like Indonesia when coal lying near the surface was exposed during deforestation. (220)



SOURCE: National Library of Medicine / TOXMAP - Commercial nuclear plants (yellow icon) and EPA coal plants 2016 (black icon) - <https://toxmap.nlm.nih.gov/toxmap/>

Nuclear Weapons and Power

In 2017, the Treaty on the Prohibition of Nuclear Weapons was finalized by some United Nations members, if successful, it would destroy all existing nuclear weapons and prohibit any future development. Of the 193-member states, 70 did not participate, this included all the nuclear superpowers, 122 voted in favor and one against which was the Netherlands, the only NATO member that participated. In 2017, there were 14,900 nuclear weapons in the world, this is down from the peak of 70,300 nuclear weapons in 1986. Although this would appear to be a vast reduction and a step towards total nuclear disarmament, it is far from the reality in that the nuclear weapons themselves are now far more powerful than those created in the past. The United States, Russia, France, Pakistan, China, United Kingdom, India, and Israel all possess active nuclear weapons, 93% of these nuclear weapons are owned by Russia and the United States. (261) Since 1945, over 2,000 nuclear weapon tests have been conducted, with the United States conducted more than half of these tests. Have *Homo sapiens* not tested enough nuclear weapons? Is it not wise to stop testing and completely disassemble all of these weapons of mass destruction? What is the point of possessing so many weapons of mass destruction that can so easily destroy the Earth 100 times over and leave it uninhabitable for anyone? What was the untold environmental impact and human health implications of all these tests and accidents listed below? How many millions of flora and fauna species died during these thousands of atomic bomb tests?



Photographs of the mushroom clouds above Hiroshima and Nagasaki in August 1945, taken shortly after **killing thousands of *Homo sapiens* simultaneously within 1 second**. These were the only two Nuclear weapons to have ever been used on a civilian population or during wartime resulting in the deaths of an estimated 129,000 - 226,000 *Homo sapiens*, mostly civilians. Source: United States Department of Defense, photos taken by: Enola Gay Tail Gunner S/Sgt. George Caron and Charles Levy aboard a B-29 Superfortresses.

Some Major Nuclear Incidents	
Date	Incident
August 1945	On the orders of President Harry S. Truman, a uranium-gun design bomb, Little Boy, was used against the city of Hiroshima, Japan. Fat Man, a plutonium implosion-design bomb was used against the city of Nagasaki. The two weapons killed between 129,000 to 226,000 civilians and military personnel, some instantly, and thousands more dying over the years after the initial blast from radiation sickness and related cancers.
Kyshtym Disaster 1945-1957	The Mayak plant was one of the largest producers of weapons-grade plutonium for the Soviet Union during much of the Cold War, particularly during the Soviet atomic bomb program. Built and operated with great haste and disregard for safety, between 1945 and 1957 the plant dumped and released large amounts of solid, liquid and gaseous radioactive material into the area immediately around the plant. Over time, the sum of radionuclide contamination is estimated to 2-3 times the release from the explosions from the Chernobyl accident. In 1957, the Mayak plant was the site of a major disaster, among all the other such accidents, releasing more radioactive contamination than Chernobyl, again. An improperly stored underground tank of high-level liquid nuclear waste exploded, contaminating thousands of square kilometres of territory, now known as the Eastern Ural Radioactive Trace (EURT). The matter was quietly and secretly covered up, and few either inside or outside Russia were aware of the full scope of the disaster until 1980. The Chelyabinsk region has been reported as being one of the most polluted places on Earth, having previously been a center of production of weapons-grade plutonium.
1950's	During the 1950s, the mushroom clouds from atmospheric tests could be seen for almost 100 mi (160 km). The city of Las Vegas experienced noticeable seismic effects, and the distant mushroom clouds, which could be seen from the downtown hotels, became tourist attractions. St. George, Utah, received the brunt of the fallout of above-ground nuclear testing in the Yucca Flats/Nevada Test Site. Winds routinely carried the fallout of these tests directly through St. George and southern Utah. Marked increases in cancers, such as leukemia, lymphoma, thyroid cancer, breast cancer, melanoma, bone cancer, brain tumors, and gastrointestinal tract cancers, were reported from the mid-1950s through 1980.
December 1952	NRX AECL Chalk River Laboratories, Chalk River, Ontario, Canada. Partial meltdown, about 10,000 Curies released. Approximately 1202 people were involved in the two year cleanup. President Jimmy Carter was one of the many people that helped clean up the accident.

March 1954	The Castle Bravo nuclear test far exceeded expectations, causing widespread radioactive contamination. It spread considerable nuclear fallout on many of the islands, including several which were inhabited, and some that had not been evacuated. The fallout also spread traces of radioactive material as far as Australia, India and Japan, and even the United States and parts of Europe.
September 1957	A plutonium fire occurred at the Rocky Flats Plant, which resulted in the contamination of Building 71 and the release of plutonium into the atmosphere.
September 1957	Kyshtym disaster: Nuclear waste storage tank explosion at Chelyabinsk, Russia. 200+ fatalities, believed to be a conservative estimate; 270,000 people were exposed to dangerous radiation levels. Over thirty small communities were removed from Soviet maps between 1958 and 1991.
October 1957	Windscale fire, UK. Fire ignites plutonium piles and contaminates surrounding dairy farms.
1959	In 1959 the US Navy removed a nuclear reactor from the submarine USS Seawolf (SSN 575) and replaced it with a new type. The removed reactor was scuttled in the Atlantic Ocean, 200 km east of Delaware, at a depth of 2,700 m. In 1972, the London Dumping Convention restricted ocean disposal of radioactive waste and in 1993, ocean disposal of radioactive waste was completely banned. The US Navy began a study on scrapping nuclear submarines; two years later shallow land burial of reactor compartments was selected as the most suitable option.
1957-1964	Rocketdyne located at the Santa Susanna Field Lab, 30 miles north of Los Angeles, California operated ten experimental nuclear reactors. Numerous accidents occurred including a core meltdown. Experimental reactors of that era were not required to have the same type of containment structures that shield modern nuclear reactors. During the Cold War time in which the accidents that occurred at Rocketdyne, these events were not publicly reported by the Department of Energy.
1963	The second USS Thresher (SSN-593) was the lead boat of her class of nuclear-powered attack submarines in the United States Navy. She was the U.S. Navy's second submarine to be named after the threshing machine. On 10 April 1963, Thresher sank during deep-diving tests about 220 miles (350 km) east of Boston, Massachusetts, killing all 129 crew and shipyard personnel aboard. Her loss was a watershed for the U.S. Navy, leading to the implementation of a rigorous submarine safety program known as SUBSAFE. The first nuclear submarine lost at sea, Thresher was also the first of only two submarines that killed more than 100 people aboard; the other was the Russian Kursk, which sank with 118 aboard in 2000. The U.S. Navy has periodically monitored the environmental conditions of the site since the sinking and has reported the results in an annual public report on environmental monitoring for U.S. Naval nuclear-powered craft. These reports provide specifics on the environmental sampling of sediment, water, and marine life which was done to ascertain whether Thresher's nuclear reactor has had a significant effect on the deep ocean environment. The reports also explain the methodology for conducting deep-sea monitoring from both surface vessels and submersibles. The monitoring data confirm that there has been no significant effect on the environment. Nuclear fuel in the submarine remains intact.
1965	Philippine Sea A-4 crash, where a Skyhawk attack aircraft with a nuclear weapon fell into the sea. The pilot, the aircraft, and the B43 nuclear bomb were never recovered. It was not until the 1980s that the Pentagon revealed the loss of the one megaton bomb.
January 1966	The 1966 Palomares B-52 crash occurred when a B-52G bomber of the USAF collided with a KC-135 tanker during mid-air refueling off the coast of Spain. The KC-135 was completely destroyed when its fuel load ignited, killing all four crew members. The B-52G broke apart, killing three of the seven crew members aboard. Of the four Mk28 type hydrogen bombs the B-52G carried, three were found on land near Almería, Spain. The non-nuclear explosive in two of the weapons detonated upon impact with the ground, resulting in the contamination of a 2-square-kilometer (490-acre) (0.78 square mile) area by radioactive plutonium. The fourth, which fell into the Mediterranean Sea, was recovered intact after a 2½-month-long search.
January 1968	The 1968 Thule Air Base B-52 crash involved a United States Air Force (USAF) B-52 bomber. The aircraft was carrying four hydrogen bombs when a cabin fire forced the crew to abandon the aircraft. Six crew members ejected safely, but one who did not have an ejection seat was killed while trying to bail out. The bomber crashed onto sea ice in Greenland, causing the nuclear payload to rupture and disperse, which resulted in widespread radioactive contamination.
January 1969	Lucens reactor in Switzerland undergoes partial core meltdown leading to massive radioactive contamination of a cavern.
May 1968	USS Scorpion (SSN-589) was a Skipjack-class nuclear submarine of the United States Navy and the sixth vessel of the U.S. Navy to carry that name. Scorpion was lost on 22 May 1968, with 99 crewmen dying in the incident. USS Scorpion is one of two nuclear submarines the U.S. Navy has lost, the other being USS Thresher. It was one of four mysterious submarine disappearances in 1968, the others being the Israeli submarine INS Dakar, the French submarine Minerve and the Soviet submarine K-129. Today, the wreck of Scorpion is reported to be resting on a sandy seabed at the bottom of the Atlantic Ocean in

	<p>approximately 3,000 m (9,800 ft) of water. The site is reported to be approximately 400 nmi (740 km) southwest of the Azores, on the eastern edge of the Sargasso Sea. The actual position is 32°54.9'N 33°08.89'W.[21] The U.S. Navy has acknowledged that it periodically visits the site to conduct testing for the release of nuclear materials from the nuclear reactor or the two nuclear weapons aboard her, and to determine whether the wreckage has been disturbed. The Navy has not released any information about the status of the wreckage, except for a few photographs taken of the wreckage in 1968, and again in 1985 by deep water submersibles.</p> <p>The Navy has also released information about the nuclear testing performed in and around the Scorpion site. The Navy reports no significant release of nuclear material from the sub. The U.S. Navy has periodically monitored the environmental conditions of the site since the sinking and has reported the results in an annual public report on environmental monitoring for U.S. nuclear-powered ships and boats. The reports provide specifics on the environmental sampling of sediment, water, and marine life that is done to ascertain whether the submarine has significantly affected the deep-ocean environment. The reports also explain the methodology for conducting this deep sea monitoring from both surface vessels and submersibles. The monitoring data confirm that there has been no significant effect on the environment. The nuclear fuel aboard the submarine remains intact and no uranium in excess of levels expected from the fallout from past atmospheric testing of nuclear weapons has been detected by the Navy's inspections. In addition, Scorpion carried two nuclear-tipped Mark 45 anti-submarine torpedoes (ASTOR) when she was lost. The warheads of these torpedoes are part of the environmental concern. The most likely scenario is that the plutonium and uranium cores of these weapons corroded to a heavy, insoluble material soon after the sinking, and they remain at or close to their original location inside the torpedo room of the boat. If the corroded materials were released outside the submarine, their density and insolubility would cause them to settle into the sediment.</p>
April 1970	<p>During the large-scale "Ocean-70" naval exercise, K-8 suffered fires in two compartments simultaneously on 8 April 1970. Due to short circuits that took place in III and VII compartments simultaneously at a depth of 120 metres (390 ft), a fire spread through the air-conditioning system. Both nuclear reactors were shut down. The captain ordered his entire crew to abandon ship but was countermanded once a towing vessel arrived. Fifty-two crewmen, including the commander, Captain 2nd Rank Vsevolod Borisovich Bessonov, re-boarded the surfaced submarine that was to be towed. This was the first loss of a Soviet nuclear-powered submarine, which sank in rough seas as it was being towed in the Bay of Biscay of the North Atlantic Ocean. Eight mariners had already died due to certain compartments being locked to prevent further flooding as well as the spread of the fire as soon as it was detected. All hands on board died due to CO₂ poisoning and the flooding of the surfaced submarine during 80 hours of damage control in stormy conditions. 73 crewmen survived. K-8 sank with four nuclear torpedoes out of total 24 on board to a depth of 4,680 metres (15,350 ft) approximately 490 kilometres (260 nmi) northwest of Spain.</p>
July 1979	<p>Church Rock Uranium Mill Spill in New Mexico, USA, when United Nuclear Corporation's uranium mill tailings disposal pond breached its dam. Over 1,000 tons of radioactive mill waste and millions of gallons of mine effluent flowed into the Puerco River, and contaminants traveled downstream.</p>
March 1979	<p>Three Mile Island accident in Pennsylvania, United States exposed 2 million people near the plant to low doses of radiation, it was also discovered later that not only those who lived close by were affected, but Three Mile Island operators ordered the dumping of radioactive water into the Susquehanna River, thus impacting those downstream. Disease rates in areas further than 10 miles from the plant were never examined by the government, but epidemiologist Joseph Mangano reported a spike in infant mortality in the downwind communities two years after the accident. Anecdotal evidence also records effects on the region's wildlife. For example, according to one anti-nuclear activist, Harvey Wasserman, the fallout caused "a plague of death and disease among the area's wild animals and farm livestock", including a sharp fall in the reproductive rate of the region's horses and cows, reflected in statistics from Pennsylvania's Department of Agriculture, though the Department denies a link with TMI. Cleanup started in August 1979, and officially ended in December 1993. Starting in 1985, almost 100 short tons of radioactive fuel were removed from the site. The first major phase of the cleanup was completed in 1990, when workers finished shipping 150 short tons of radioactive wreckage to Idaho for storage at the Department of Energy's National Engineering Laboratory. However, the contaminated cooling water that leaked into the containment building had seeped into the building's concrete, leaving the radioactive residue impractical to remove. In 1988, the Nuclear Regulatory Commission announced that, although it was possible to further decontaminate the Unit 2 site, the remaining radioactivity had been sufficiently contained as to pose no threat to public health and safety. Accordingly, further cleanup efforts were deferred to allow for decay of the radiation levels and to take advantage of the potential economic benefits of retiring both Unit 1 and Unit 2 together. Although the citizens of the three counties surrounding the site voted by a margin of 3:1 to retire Unit 1 and close the plant permanently, it was permitted to resume operations in 1985. In 2009, the NRC granted a license extension which allows the TMI-1 reactor to operate until April 19, 2034. Ironically the accident at the plant occurred twelve days after the release of the movie The China Syndrome starring Jane Fonda, Michael Douglas, and Jack Lemmon.</p>
1981	<p>K-27 was officially decommissioned on 1 February 1979 and its reactor compartment was filled with a special solidifying mixture of furfuryl alcohol and bitumen during the summer of 1981 to seal the compartment to avoid pollution of the ocean with radioactive products. This work was performed by the Severodvinsk shipyard No. 893</p>

	<p>"Zvezdochka".</p> <p>Then K-27 was towed to a special training area in the eastern Kara Sea, and it was scuttled there on 6 September 1982 near the location 72°31'28"N., 55°30'09"E. off the northeastern coast of Novaya Zemlya (at Stepovoy Bay), in a fjord at a depth of just 33 meters (108 feet). It was necessary for a naval salvage tug to ram the stern of K-27 to pierce its aft ballast tanks and sink it, because K-27's bow had impacted the seafloor while its stern was still afloat. This scuttling was performed contrary to the International Atomic Energy Agency's requirement that nuclear-powered submarines and surface ships must be scuttled at depths not less than 3,000 meters.</p> <p>The last scientific expedition of the "Russian Ministry of Emergencies" to the Kara Sea examined the site of the scuttling in September 2006. Numerous samples of the seawater, the seafloor, and the sealife were gathered and then analyzed. The final report stated that the radiation levels of the area were stable. Lessons in nuclear submarine construction and safety learned from Projekt 645 were applied in Projects 705 and 705K – that produced the Soviet Alfa class submarines. These were equipped with similar liquid-metal-cooled reactors.</p> <p>In September 2012 it was reported that the submarine needed to be lifted from its shallow bed in the Kara Sea. The vessel was said to be a "nuclear time bomb", and that the rusting and decaying vessel may be reaching a critical level leading to an "uncontrolled chain reaction". Although a joint Russian and Norwegian mission in 2012 did not find alarming levels of radioactivity in the water and soil surrounding the submarine, an urgent consideration pertains to the dismantling of the nuclear reactors should the submarine be raised. Because the reactors were cooled by liquid metals, the nuclear rods became fused with the coolant when the reactors were stopped and conventional methods cannot be used for disassembling the reactors. However, France's Commissariat à l'énergie atomique et aux énergies alternatives designed and donated special equipment for a dedicated dry-dock (SD-10) in Gremikha, which was used to dismantle the Alfa-class submarines that shared this design feature. However, since the last Alfa reactor was dismantled in 2011, this equipment is at risk. In 2017, plans were again mooted to raise the submarine, by 2022. The Krylov State Research Center of St Petersburg announced that it was working on plans for a catamaran floating dock, capable of such heavy lifts from the seabed.</p>
1984	<p>Fernald Feed Materials Production Center gained notoriety when it was learned that the plant was releasing millions of pounds of uranium dust into the atmosphere, causing major radioactive contamination of the surrounding areas.</p>
1986	<p>On Friday 3 October 1986, while on an otherwise routine Cold War nuclear deterrence patrol in the North Atlantic 680 miles (1,090 km) northeast of Bermuda, the 15-year-old K-219 Russian submarine suffered an explosion and fire in a missile tube. The seal in a missile hatch cover failed, allowing saltwater to leak into the missile tube and react with residue from the missile's liquid fuel. Though there was no official announcement, a published source (citing no sources) said the Soviet Union claimed that the leak was caused by a collision with the submarine USS Augusta. Augusta was certainly operating in proximity, but both the United States Navy and the commander of K-219, Captain Second Rank Igor Britanov, deny that a collision took place. K-219 had previously experienced a similar casualty; one of her missile tubes was already disabled and welded shut, having been permanently sealed after an explosion caused by reaction between seawater leaking into the silo and missile fuel residue.</p> <p>Shortly after 0530 Moscow time, seawater leaking into silo six of K-219 reacted with missile fuel, producing chlorine and nitrogen dioxide gases and sufficient heat to explosively decompose additional fuming nitric acid to produce more nitrogen dioxide gas. K-219 weapons officer Alexander Petrachkov attempted to cope with this by disengaging the hatch cover and venting the missile tube to the sea. Shortly after 0532, an explosion occurred in silo six. The remains of the RSM-25 rocket and its two warheads were ejected from silo six into the sea.</p> <p>An article in Undersea warfare by Captain First Rank (Ret.) Igor Kurdin, Russian Navy - K-219's XO (executive officer) at the time of the incident - and Lieutenant Commander Wayne Grasdock, USN described the explosion occurrence as follows:</p> <p>At 0514, the BCh-2 officer and the hold machinist/engineer in compartment IV (the forward missile compartment) discovered water dripping from under the plug of missile tube No. 6 (the third tube from the bow on the port side). During precompression of the plug, the drips turned into a stream. The BCh-2 officer reported water in missile tube No. 6, and at 0525, the captain ordered an ascent to a safe depth (46 meters) while a pump was started in an attempt to dry out missile tube No. 6. At 0532, brown clouds of oxidant began issuing from under the missile-tube plug, and the BCh-2 officer declared an accident alert in the compartment and reported the situation to the GKP (main control post). Although personnel assigned to other compartments left the space, nine people remained in compartment IV. The captain declared an accident alert. It took the crew no more than one minute to carry out initial damage control measures, which included hermetically sealing all compartments. Five minutes later, at 0538, an explosion occurred in missile tube No. 6. <i>Lieutenant Commander Wayne Grasdock, USN</i></p> <p>Two sailors were killed outright in the explosion, and a third died soon afterward from toxic gas poisoning. Through a breach in the hull, the vessel immediately started taking on sea water, quickly sinking from its original</p>

	<p>depth of 40 metres (130 ft) to eventually reach a depth in excess of 300 metres (980 ft). Sealing of all of the compartments and full engagement of the sea water pumps in the stricken compartments enabled the depth to be stabilised.</p> <p>25 sailors were trapped in a sealed section, and it was only after a conference with his incident specialists that the Captain allowed the Chief Engineer to open the hatch and save the 25 lives. It could be seen from instruments that although the nuclear reactor should have automatically shut down, it was not. Twenty-year-old enlisted seaman Sergei Preminin volunteered to shut down the reactor, to be enabled by operating under instruction from the Chief Engineer. Working with a full-face gas mask, he successfully shut down the reactor. A large fire had developed within the compartment, raising the pressure. When Preminin tried to reach his comrades on the other side of a door, the pressure difference prevented him from opening it, and he subsequently died of asphyxiation in the reactor compartment.</p> <p>In a nuclear safe condition, and with sufficient stability to allow it to surface, Captain Britanov surfaced K-219 on battery power alone. He was then ordered to have the ship towed by a Soviet freighter back to her home port of Gadzhievo, 7,000 kilometres (4,300 mi) away. Although a towline was attached, towing attempts were unsuccessful, and after subsequent poison gas leaks into the final aft compartments and against orders, Britanov ordered the crew to evacuate onto the towing ship, but remained aboard K-219 himself.</p> <p>Displeased with Britanov's inability to repair his submarine and continue his patrol, Moscow ordered Valery Pshenichny, K-219's security officer, to assume command, transfer the surviving crew back to the submarine, and return to duty. Before those orders could be carried out the flooding reached a point beyond recovery and on 6 October 1986 the K-219 sank to the bottom of the Hatteras Abyssal Plain[10][11] at a depth of about 6,000 m (18,000 ft). Britanov abandoned ship shortly before the sinking. K-219's full complement of nuclear weapons was lost along with the vessel.</p>
April 1986	Chernobyl disaster which occurred in 1986 in Ukraine. The accident killed 31 people directly and damaged approximately \$7 billion of property. A study published in 2005 estimates that there will eventually be up to 4,000 additional cancer deaths related to the accident among those exposed to significant radiation levels. Radioactive fallout from the accident was concentrated in areas of Belarus, Ukraine and Russia. Approximately 350,000 people were forcibly resettled away from these areas soon after the accident. Ukrainian officials estimate the area will not be safe for human life again for another 20,000 years. If the forests that have been contaminated by radioactive material catch on fire, they will spread the radioactive material further outwards in the smoke. Liquidators were the civil and military personnel who were called upon to deal with consequences of the 1986 Chernobyl nuclear disaster in the Soviet Union on the site of the event. The liquidators are widely credited with limiting both the immediate and long-term damage from the disaster. According to Vyacheslav Grishin of the Chernobyl Union, the main organization of liquidators, "25,000 of the Russian liquidators are dead and 70,000 disabled, about the same in Ukraine, and 10,000 dead in Belarus and 25,000 disabled", which makes a total of 60,000 dead (10% of the 600 000, liquidators) and 165,000 disabled.
September 1987	Goiania accident. Four fatalities, and following radiological screening of more than 100,000 people, it was ascertained that 249 people received serious radiation contamination from exposure to caesium-137. In the cleanup operation, topsoil had to be removed from several sites, and several houses were demolished.
April 1993	Accident at the Tomsk-7 Reprocessing Complex, when a tank exploded while being cleaned with nitric acid. The explosion released a cloud of radioactive gas.
May 1998	The Acerinox accident was an incident of radioactive contamination in Southern Spain. A caesium-137 source managed to pass through the monitoring equipment in an Acerinox scrap metal reprocessing plant. When melted, the caesium-137 caused the release of a radioactive cloud.
May 2005	A Thermal Oxide Reprocessing Plant in the UK suffered a large leak of a highly radioactive solution, which first started in July 2004. British Nuclear Group's board of inquiry determined that a design error led to the leak, while a complacent culture at the plant delayed detection for nine months. Operations staff did not discover the leak until safeguards staff reported major fluid accountancy discrepancies.
March 2011	Fukushima I nuclear accidents occurred after an earthquake caused a tsunami and damaged the reactor. The Fukushima site remains highly radioactive, with some 160,000 evacuees still living in temporary housing, and some land will be unfarmable for centuries. The difficult cleanup job will take 40 or more years, and cost tens of billions of dollars. Caesium-134 and caesium-137 were released into the environment during nearly all nuclear weapon tests and some nuclear accidents, most notably the Chernobyl disaster and the Fukushima Daiichi disaster. Caesium-137 in the environment is substantially anthropogenic (human-made). Unlike most other radioisotopes, caesium-137 is not produced from the same element's nonradioactive isotopes but as a byproduct of the nuclear fission of much heavier elements; until the building of the first artificial nuclear reactor, the Chicago Pile-1, in late 1942, caesium-137 had not occurred on Earth in significant amounts for about 1.7 billion years
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

As of 2013, there were 434 nuclear power plants operating worldwide, and 100 of these were in the United States. (89) More than 2,200,000 tons of uranium has been produced worldwide with around 40,000 tons still being produced each year. (466) Nuclear power plants worldwide have produced more than 200,000 tonnes of spent fuel since the 1960s, with around 10,000 tonnes being added each year. (467) With all the accidents listed above, and given the toxic waste produced and its half-life, is nuclear power really an energy source which should be used? Why would anyone support an energy source which produces toxic waste that takes so many thousands of years to decay? Will there ever be a Yucca Mountain Nuclear Waste Repository, or will radioactive waste continue to be stored on-site at nuclear power plants? Is this on-site storage of toxic radioactive waste an accident waiting to happen? Why hasn't it all been properly stored in the past? The United States, Russia, Japan, Italy, South Korea, Switzerland, United Kingdom, and a few other nations have all dumped radioactive waste into the ocean. In 1992, the New York Times reported that,

"In the early years of the American nuclear submarine program, captains would at times flush the radioactive coolant waters from their reactor plants directly into the ocean, but the practice ended early in the 1960's, a former submarine commander said.

In July 1957, when the Navy was disposing of drums containing radioactive sodium at sea, two drums would not sink, a history of the Atomic Energy Commission says. Naval aircraft were summoned to strafe them with machine-gun fire until they sank."

"Between 1946 and 1970, the Atomic Energy Commission supervised the disposal of about 107,000 drums of low-level radioactive wastes at sites off the Atlantic and Pacific coasts, according to the history of the commission and a report by Daniel P. Finn for the Senate Intelligence Committee.

Some radioactive waste containers were dumped in the 1950's in 300 feet of water 12 miles from Boston Harbor, and other containers were dumped around the Farallon Islands off San Francisco.

Ocean dumping of low-level radioactive wastes by the United States ended about 1970 with the passage of the Marine Protection, Research and Sanctuaries Act, referred to as the ocean dumping act. Because of safety concerns, the Navy decided in the 1980's that it would not scuttle the empty reactor chambers or hull sections from nuclear submarines in the ocean. They are now being stored at Hanford, Wash." (518)

Chernobyl has been sitting since 1986, a toxic heap waiting to be cleaned up, and according to the Ukrainian Government the reactors will be dismantled by 2065. Scientists estimate the area will not be safe for human life again for another 20,000 years, but until then Chernobyl has become a frequently visited tourist area. The lingering effects from this nuclear disaster on wildlife still continue 30 years later. Die Welt reported that of the 440,350 wild boar killed in the 2010 hunting season in Germany, over 1,000 were found to be contaminated with levels of radiation above the permitted limits, and this was due to residual radioactivity from Chernobyl. In 2009, the Norwegian Agricultural Authority reported that a total of 18,000 livestock in Norway needed to be given uncontaminated feed before slaughter to ensure that the meat was safe for human consumption, as there is residual radioactivity from Chernobyl in the plants they graze on in the wild. By 2000, some 3,500,000 citizens of Ukraine received state benefits for being radiation sufferers. Surrounding forests that have been contaminated by radiation also have the potential to catch fire and spread radiation even further to surrounding areas through the atmosphere via the smoke. Why are '*normal*' accidents or '*system accidents*' like the Three Mile Island, Chernobyl, and Fukushima disasters accepted and justified as being an inevitability consequence of using nuclear power because it is an extremely complex system? If there is even the slightest chance of an accident or major catastrophe from something so toxic, should not that technology be abandoned, especially when so many safer alternatives exist?

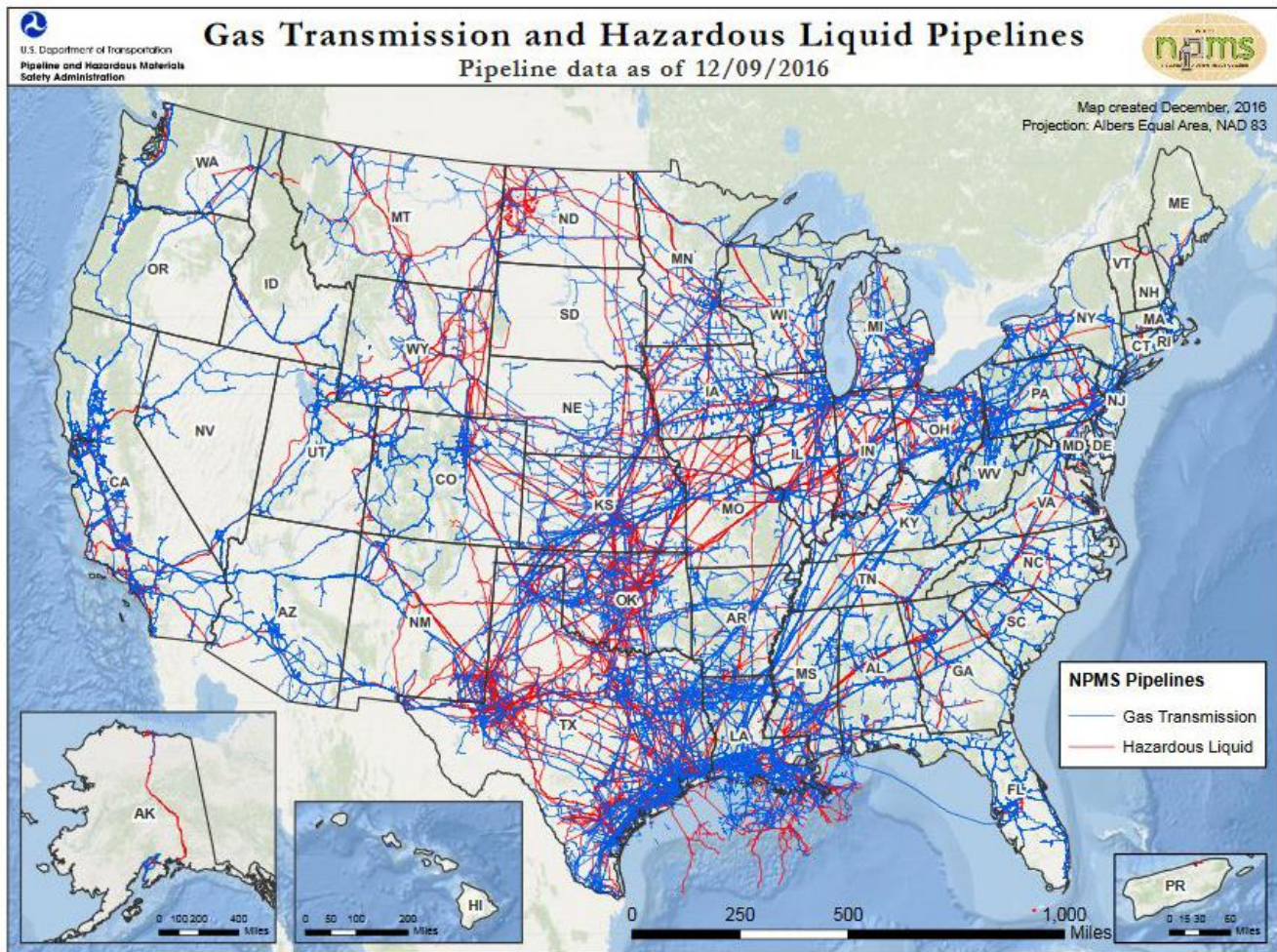
Other Scars

As of 2017, there were more than 2,000,000 miles of pipeline covering the Earth's surface, (213) with an additional 118,623 miles of pipeline planned or under construction. (214) These pipelines carry oil, natural gas, water, and sewage, and often there are small leaks which occur polluting the Earth.

Argo float deployments began in 2000 and continue at the rate of about 800 per year. When the battery runs out

most of these will drift around in the deep ocean and eventually fall to the sea bed. These floats contain battery, hydraulic fluid, and plastic parts which now pollute the ocean floor. (107) How many thousands more of these floats will be deployed? Why can't these floats be designed to either be recovered when they die or in a more eco-friendly manner?

There are 580,000 miles of telecommunications cables which cross the globe on the ocean floors, if satellites or other future technology renders these cables obsolete, much like terrestrial phone lines are now with the rise of cell phone use, will these cables be left to contaminate the ocean ecosystems? Worldwide there are millions of miles of electrical, fiber optic, telephone, and other cables stretching across the terrestrial surface of the Earth. How many millions of birds, squirrels, and other faunae have been electrocuted on above ground electrical cables? How many millions of trees and other flora are pruned or killed each year to maintain above ground cables? Would it not be more logical to bury all cables to protect nature from these cables and vice versa?



SOURCE: National Pipeline Mapping System - <https://www.npms.phmsa.dot.gov/>

When concrete and cement are manufactured, large amounts of carbon dioxide are emitted directly from the manufacturing process, as well as indirectly from the use of fossil fuels to create the energy for production. Depending on the origin and composition of the raw materials used to make the concrete or cement, heavy metals like thallium, cadmium, mercury, and selenium are also released into the atmosphere during the manufacturing process. Will the construction industry and other relevant industry sectors eventually replace traditional concrete and cement with innovative technologies which are eco-friendly? Low Temperature Solidification (LTS) by Solidia Technologies, not only sequesters carbon dioxide during the processing phase, is stronger and more versatile, costs less to produce, uses less water and energy to create, but also cures in less than 24 hours. Other bio-composite materials like hempcrete also sequester carbon dioxide in addition to acting as an

insulator and moisture regulator. What would the world look like if organic architecture was used more instead of traditional urban design and other types which do not incorporate any nature whatsoever?

There have most likely been millions of high altitude balloons launched since the first balloon was released more than 230 years ago. Today thousands of high altitude balloons are still launched each year, not only by scientists to make atmospheric observations, but by students and balloon enthusiasts with no intention of scientific research, but more for entertainment and replication purposes. Sometimes an effort to recover only the data and not the balloon is made, but with most modern-day balloons utilizing inexpensive technology, data is now transmitting directly to the observer and thus the balloons are now considered even more expendable so little to no effort is ever made to recover the balloon. Many of the balloons land in remote ecosystems or in the ocean and create balloon waste which pollutes an ecosystem. Research done in 2014 to assess the impacts of weather balloons in the Great Barrier Reef World Heritage Area, found that between 65% and 70% of weather balloons land in the ocean, and further analysis of beach cleanup data found that there were 2,460 weather balloon fragments recovered from 24 sites within the Great Barrier Reef World Heritage Area. (509) Must antiquated balloons be launched to make scientific observations, can they not be made with an unmanned aerial vehicle (UAV), satellites, or other innovative technology?

In 2017, around 2,626,418 *Homo sapiens* died in the United States, and nearly 50% of these bodies were embalmed using a mixture of formaldehyde, glutaraldehyde, methanol, and other solvents, and then buried in the ground allowing these toxic chemicals to slowly seep out contaminating the soil and groundwater. For each 50lbs of body weight 1 gallon of embalming fluid is used, each year in the United States alone, an estimated 4,500,000 gallons of embalming fluid are put into the ground. How many millions of gallons of this toxic concoction have been put into the soils of Earth over the last 50 years? Can *Homo sapiens* not simply be buried naturally in the soil of Earth with no chemicals, and allow nature to do its processes through the insects, bacteria, fungi, and other natural elements, recycling the body as it does so well with all dead organic life?

Before desecrating Mount Rushmore, Gutzon Borglum first destroyed Stone Mountain when he was commissioned to design a Confederate Memorial Carving, which would eventually become the largest bas-relief sculpture in the world. In 1941, Mount Rushmore National Memorial was completed, the sculpture is carved into the face of Mount Rushmore and features the heads of four United States presidents. Begun in 1948, the Crazy Horse Memorial was commissioned in response to the Mount Rushmore monument not including an indigenous *Homo sapiens*. Is it really art when another piece of beautiful art, the mountain sculpted by nature over millions of years, is desecrated and permanently altered?

An estimated 4,000,000 to 5,000,000 birds are killed each year when they collide with man-made obstructions. (e.g. buildings, wind turbines, power lines, communications towers, etc.) (465) Will there ever be more research done to find a way to prevent these millions of senseless deaths, which are nothing more than another side effect of civilization not coexisting with nature?

CHAPTER III. *Homo sapiens* Depredation of Earth

Earth's Equilibrium Formula

Some foolishly think the Earth is so big that it can take any depredation *Homo sapiens* do to it, that somehow things will just work out, that *Homo sapiens* and technology can and will fix anything, but this assumption is an erroneous and often fatal mistake. Along with trees and a small percentage of other flora and fauna, *Homo sapiens* are one of the longest living species which inhabit Earth, and yet this is still a very brief time, 876,000 hours if one were to live to the age of 100. But when *Homo sapiens* die, their depredations and the scars that they leave behind on Earth from careless and thoughtless actions will last many years into the future, and some of these scars will last forever. J. Eric S. Thompson wrote,

“Maya history underlines the universal truth that good ends can never justify evil means for the simple reason that evil means can only destroy and contaminate the end. The evil that men do lives after them.” (31)

The entire planet of Earth has what could be termed an ‘*equilibrium formula*’, chaotic it may seem at times, this formula is a perfectly balanced system of processes and naturally made chemical elements which make Earth able to sustain organic lifeforms, among other amazing things. The Earth has a variety of different ecosystems which in essence compose one huge ecosystem which is the Earth itself. Four major systems on Earth work in conjunction with one another to make these ecosystems possible, the atmosphere, biosphere, hydrosphere, and lithosphere. All of Earth's systems are interconnected, and things which happen in one sphere can affect the other spheres, and ultimately the entire system. A devastating change to the atmosphere, biosphere, hydrosphere, or lithosphere could cause irreversible negative impacts making all life on Earth extinct. The advent of technology has only exacerbated depredations done by *Homo sapiens* and helped to negatively impact these fragile spheres at a more rapid rate than in the past. Nature is resilient, withstanding and even reversing most negative impacts which are inflicted upon it, both naturally occurring and those perpetrated by *Homo sapiens*. This resilience can be seen in all aspects of nature and even in the simple processes which nature displays when healing itself, from the purification of water being filtered through the Earth itself, to sunlight UV degradation of most any substance. Nature can do amazing things if given time, but many of these healing processes could take hundreds, even thousands of years, and *Homo sapiens* depredations are not ceasing, they are continuing ever more rapidly and have far outpaced Earth's ability to naturally heal itself.

No species can continue to thrive and depredate its environment as *Homo sapiens* have done without severe negative consequences, and this is becoming ever more apparent with each day that passes. The current ecocide which is occurring in ecosystems throughout the world is expanding each year, and no square inch of Earth seems to not have been affected by anthropogenic activities, and every day more depredations continue to happen. Is a toxic Earth really what future generations should inherit? Will future generations feel as though their ancestors robbed them of something, as some already feel today? Will they ask why their ancestors destroyed the Earth without even thinking of the future? If *Homo sapiens* continue altering this equilibrium formula by destroying ecosystems, adding new ingredients, and influencing the processes, is the formula then broken forever, or can nature counteract these alterations with other processes possibly unknown to science? How many additional ingredients can be added by *Homo sapiens*, and how much more manipulation can the formula that balances all of Earth take before it no longer works, and the Earth is permanently changed? How much longer can Earth's biogeochemical cycle handle the stress and additional elements *Homo sapiens* are adding to it? How much more pollution can Earth take? How many more millions of gallons of toxic chemicals can Earth absorb? How much more anthropogenic impact can the terrestrial and aquatic ecosystems of Earth withstand? How much more destruction can Earth endure before nature begins to collapse irreversibly? Have *Homo sapiens* already crossed the point of no return and another mass extinction is now inevitable? Can *Homo sapiens* coexist with this equilibrium formula and stop trying to modify and control it? *Homo sapiens* walk around an art museum or other delicate place created by *Homo sapiens*, and they do it with such care as so not to hurt the beauty which surrounds them, does the Earth itself deserve any less? Is Earth not as beautiful as the art creations of *Homo sapiens*? Can *Homo sapiens* not treat the Earth with a delicate hand instead of a manipulative and destructive one? Why do only a minority of *Homo sapiens* see the destruction of the many?

Toxic Unnatural Chemicals

An irony commonly pointed out, is that the chemist Thomas Midgley, Jr., developed tetraethyllead (TEL), a gasoline additive which resulted in the release of large quantities of lead into the atmosphere, and that he also developed chlorofluorocarbons (CFCs), the ozone-depleting greenhouse gas. Thus, it could be said that Midgley's work helped destroy the atmosphere of Earth more than any other single *Homo sapiens*. Although, it should be noted that since Midgley's time there have been many other deadly chemicals that have been invented and used, so this statement may not hold true for much longer. Synthetic chemicals are most often invented, little tested, and then manufactured in vast quantities, many are not even regulated, and the public has access to a wide range of highly toxic substances which they are often encouraged to use. It should also be remembered, that often synthetic chemicals which are first deemed safe are later found not to be. (e.g. CFCs which were said to have been tested and safe were a replacement for previous chemicals that were harmful on contact, CFCs were later linked to the destruction of the Ozone layer) Should not these chemicals be more rigorously tested and regulated?

Synthetic chemicals are not found naturally anywhere on Earth, nature has no need for them and does not make them, they are only created by *Homo sapiens* in a laboratory, and most are toxic to all lifeforms. Since the chemical revolution of the 1930's, *Homo sapiens* have been exposed to unnatural and even toxic chemicals before they are born until the moment they die, simply by breathing the air, drinking water, eating food, absorption through their skin by daily use of synthetic products, and even from the synthetically made clothes they wear. All of *Homo sapiens* depredations affect every living organism on Earth, there is potential exposure through breathing the air, ingesting water and food, or absorption into the skin or shell. Over time all living organisms on Earth can accumulate toxins from fertilizers, pesticides, metals, and other toxic chemicals. As excretion of these toxins is slow, bioaccumulation can occur over long periods of exposure, and the toxins can remain in the species indefinitely throughout the species lifespan causing negative health issues. This bioaccumulation can also potentially cause a biomagnification which can affect everything in the food chain. When the toxic organism is consumed, the toxicity can be passed up the food chain to the organisms feeding on each other sometimes also amplifying the levels of accumulation. (e.g. an insect has adsorbed a toxic chemical from a water source which was runoff from an herbicide that is used on a nearby farm, a bird eats a vast quantity of these toxic insects resulting in higher concentrations of the toxic chemical.) Bioaccumulation and biomagnification pose serious problems to *Homo sapiens* in the future as they are at the top of the food chain and consume many flora and fauna that could potentially biomagnify many of the toxic chemicals *Homo sapiens* are polluting the Earth with. A prime example of this can be seen in a 1987 study, which discovered the breast milk of Inuit women contained high levels of polybrominated biphenyls (PCBs) that were subsequently being passed to Inuit infants. It was concluded that it was a result of the mothers consuming fish which contained PCBs, and that the Inuit mothers breast milk had the highest concentration levels of PCB's of any women's breast milk in the world. (661)

There have only been a few major industrial disasters in the past which claimed a relatively small number of victims, and this has in part led to more public acceptance of these toxic chemicals being used in such vast quantities. But what most do not realize, is that pollution is a slow and silent killer which when persistent in the environment, be it the air, water, or soil, it will bioaccumulate and lead to premature death from cancer, cardiovascular, respiratory, or other ailments. And as these diseases are so commonplace and even accepted in society as being just a part of life, the source often is never truly identified as being environmental.

Today the Earth is more unbalanced than it has ever been during its history. This imbalance is caused by anthropogenic activities, which have resulted in the highest concentrations of toxic chemicals in the air, water, and soil more so now than during any point of *Homo sapiens* brief time on Earth. How much more can the Earth take? Has too much pollution already been released? What long-term and possibly even irreversible consequences will these toxic chemicals have on Earth? How many thousands of synthetically created toxic chemicals that are not a natural part of Earth have been introduced into ecosystems? Why does the government set maximum limits and tolerable amounts of chemical exposure? Why are toxic chemicals accepted as just

another part of life in the food, air, and water, with the Environmental Protection Agency setting contaminant standards? If a chemical is unnatural and possibly toxic, why is the use even tolerated? If the chemical being used is toxic to life and is not bio-degradable shouldn't it be abandoned, no exceptions? What long term affects will all these toxic synthetic chemicals ultimately have on the Earth?

These synthetically made unnatural toxic chemicals are relatively new additions to the world which did not exist until around 100 years ago, so there is no way to know what long-term effects they will perhaps have on *Homo sapiens* or Earth in the future. Rachel Carson's stern warning in '*Silent Spring*' more than 50 years ago has been ignored and forgotten by most, with newer and even deadlier chemicals becoming even more commonplace today. Is this the accepted norm now, that toxicity is just a part of life and few want to truly discuss or address the issue? Using science, *Homo sapiens* have created chemicals that are not naturally found anywhere on Earth, they are not a part of any natural process on Earth, and are not needed by nature for any reason. They are also usually very toxic to most forms of life and negatively impact the environment. Have not enough organisms died as a result of these chemicals to know that using these chemicals will only bring more death? Is there not a less toxic more natural way to produce food, manufacture commercial goods, and meet the needs of *Homo sapiens* to sustain life? If a chemical, element, or other source material, be it natural or synthetically made causes harm to any living organism on Earth, be it in the manufacturing or consumption process, why would one ever even attempt to utilize it?

Some of the toxic chemicals being used have a short half-life of a few months to a few years, others are longer, and some even as long as several thousand years. Persistent organic pollutants (POPs) are resistant to environmental degradation and can bioaccumulate impacting the health of all living organisms. Compounds that make up POPs are classed as Persistent Bio-accumulative and Toxic (PBTs) or Toxic Organic Micro Pollutants (TOMPs). In 2001, the United Nations Environment Programme (UNEP) adopted The Stockholm Convention in an attempt to regulate POPs, 180 countries have since ratified the convention except the United States and a few other countries.

A 2016 study found 45 toxic chemicals present in household dust. (200) Persistent organic pollutants have even reached the most remote and inaccessible regions of Earth 10,000 meters below the ocean surface. A study released in 2017 of multiple endemic and ecologically equivalent lysianassoid amphipod crustacea from the Mariana and Kermadec trenches, found polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) present in all samples across all species at all depths in both trenches. (541) In November 2017, a fisherwoman from Grand Manan Island, Canada retrieved a lobster with a Pepsi logo embedded into its shell, which was most likely embedded during a molting stage. (634)

Persistent Organic Pollutant (POP)	Description
Aldrin	Insecticide used in soils to kill termites, grasshoppers, western corn rootworm, and others, is also known to kill birds, fish, and humans. Humans are primarily exposed to Aldrin through dairy products and animal meats.
Chlordane	Insecticide used to control termites and on a range of agricultural crops, is known to be lethal in various species of birds, including mallard ducks, bobwhite quail, and pink shrimp; Chlordane has been postulated to affect the human immune system and is classified as a possible human carcinogen. Chlordane air pollution is believed the primary route of humane exposure.
Dieldrin	Insecticide used to control termites, textile pests, insect-borne diseases and insects living in agricultural soils. In soil and insects, Aldrin can be oxidized, resulting in rapid conversion to dieldrin. Dieldrin is highly toxic to fish and other aquatic animals, particularly frogs, whose embryos can develop spinal deformities after exposure to low levels. Dieldrin has been linked to Parkinson's disease, breast cancer, and classified as an immunotoxin, neurotoxic, with endocrine disrupting capacity. Dieldrin residues have been found in air, water, soil, fish, birds, and mammals. Human exposure to dieldrin primarily derives from food.
Endrin	Insecticide sprayed on the leaves of crops, and used to control rodents. Animals can metabolize Endrin, so fatty tissue accumulation is not an issue, however the chemical has a long half-life in soil for up to 12 years. Endrin is highly toxic to aquatic animals and humans as a neurotoxin. Human

	exposure results primarily through food.
Heptachlor	Pesticide primarily used to kill soil insects and termites, along with cotton insects, grasshoppers, other crop pests, and malaria-carrying mosquitoes. Heptachlor, even at very low doses has been associated with the decline of several wild bird populations – Canada geese and American kestrels. In laboratory tests have shown high-dose heptachlor as lethal, with adverse behavioral changes and reduced reproductive success at low-doses, and is classified as a possible human carcinogen. Human exposure primarily results from food.
Hexachlorobenzene(HCB)	First introduced in 1945–1959 to treat seeds because it can kill fungi on food crops. HCB-treated seed grain consumption is associated with photosensitive skin lesions, colic, debilitation, and a metabolic disorder called porphyria turcica, which can be lethal. Mothers who pass HCB to their infants through the placenta and breast milk had limited reproductive success including infant death. Human exposure is primarily from food.
Mirex	Insecticide used against ants and termites or as a flame retardant in plastics, rubber, and electrical goods. Mirex is one of the most stable and persistent pesticides, with a half-life of up to 10 years. Mirex is toxic to several plant, fish and crustacean species, with suggested carcinogenic capacity in humans. Humans are exposed primarily through animal meat, fish, and wild game.
Toxaphene	Insecticide used on cotton, cereal, grain, fruits, nuts, and vegetables, as well as for tick and mite control in livestock. Widespread Toxaphene use in the US and chemical persistence, with a half-life of up to 12 years in soil, results in residual Toxaphene in the environment. Toxaphene is highly toxic to fish, inducing dramatic weight loss and reduced egg viability. Human exposure primarily results from food. The compound is classified as a possible human carcinogen.
Polychlorinated biphenyls (PCBs)	One estimate (2006) suggested that 1 million tons of PCBs had been produced. 40% of this material was thought to remain in use. Another estimate put the total global production of PCBs on the order of 1.5 million tons. The United States was the single largest producer with over 600,000 tons produced between 1930 and 1977. The European region follows with nearly 450,000 tons through 1984. It is unlikely that a full inventory of global PCB production will ever be accurately tallied, as there were factories in Poland, East Germany, and Austria that produced unknown amounts of PCBs. PCB's utility was based largely on their chemical stability, including low flammability, and high dielectric constant. In an electric arc, PCBs generate incombustible gases. Use of PCBs is commonly divided into closed and open applications. Examples of closed applications include coolants and insulating fluids (transformer oil) for transformers and capacitors, such as those used in old fluorescent light ballasts, hydraulic fluids, lubricating and cutting oils, etc. In contrast, the major open application of PCBs was in carbonless copy ("NCR") paper, which even nowadays results in paper contamination. Other open applications were as plasticizers in paints and cements, stabilizing additives in flexible PVC coatings of electrical cables and electronic components, pesticide extenders, reactive flame retardants and sealants for caulking, adhesives, wood floor finishes, such as Fabulon and other products of Halowax in the U.S., de-dusting agents, waterproofing compounds, casting agents. Through the 1960s Monsanto Chemical Company knew increasingly more about PCB's harmful effects on humans and the environment, per internal leaked documents released in 2002, yet PCB manufacture and use continued with few restraints until the 1970s. PCBs have been detected in the air, water, and soil as well as in fish and other aquatic life, PCBs can also biomagnify. As early as 1937 Monsanto knew about the systemic toxic effects of PCBs from tests conducted on animals. And in 1969 thy stated, "There is too much customer/market need and selfishly too much Monsanto profit to go out." (234) How can a company be allowed to inflict such permanent damage to the planet and all the inhabitants for money and get away with it? How can the government regulators and even the public turn a blind eye to this type of behavior?
Dichlorodiphenyltrichloroethane (DDT)	<p>Widely used as insecticide during WWII to protect against malaria and typhus. After the war, DDT was used as an agricultural insecticide. DDT's persistence in the soil for up to 10–15 years after application has resulted in widespread and persistent DDT residues throughout the world including the arctic, even though it has been banned or severely restricted in most of the world. DDT is toxic to many organisms including birds where it is detrimental to reproduction due to eggshell thinning. DDT can be detected in foods from all over the world and food-borne DDT remains the greatest source of human exposure. Short-term acute effects of DDT on humans are limited, however long-term exposure has been associated with chronic health effects such as diabetes, carcinogenic, reduced reproductive success, and has been linked to neurological disease.</p> <p>Bolivian hemorrhagic fever was first encountered in 1962, in the Bolivian village of San Joachim, hence the name "Bolivian" Hemorrhagic Fever. When initial investigations failed to find an arthropod carrier, other sources were sought before finally determining that the disease was carried by infected mice. Although mosquitoes were not the cause as originally suspected, the extermination of mosquitoes using DDT to prevent malaria proved to be indirectly responsible for the outbreak in that</p>

	<p>the accumulation of DDT in various animals along the food chain led to a shortage of cats in the village; subsequently, a mouse plague erupted in the village, leading to an epidemic</p> <p>Once a common sight in much of the continent, the bald eagle was severely affected in the mid-20th century by a variety of factors, among them the thinning of egg shells attributed to use of the pesticide DDT. Bald eagles, like many birds of prey, were especially affected by DDT due to biomagnification. DDT itself was not lethal to the adult bird, but it interfered with the bird's calcium metabolism, making the bird either sterile or unable to lay healthy eggs. Female eagles laid eggs that were too brittle to withstand the weight of a brooding adult, making it nearly impossible for the eggs to hatch. It is estimated that in the early 18th century, the bald eagle population was 300,000–500,000, but by the 1950s there were only 412 nesting pairs in the 48 contiguous states of the US. With regulations in place and DDT banned, the eagle population rebounded. The bald eagle can be found in growing concentrations throughout the United States and Canada, particularly near large bodies of water. In the early 1980s, the estimated total population was 100,000 individuals, with 110,000–115,000 by 1992; the U.S. state with the largest resident population is Alaska, with about 40,000–50,000, with the next highest population the Canadian province of British Columbia with 20,000–30,000 in 1992.</p>
trichloroethylene	<p>The chemical compound trichloroethylene is a halocarbon commonly used as an industrial solvent. When it was first widely produced in the 1920s, trichloroethylene's major use was to extract vegetable oils from plant materials such as soy, coconut, and palm. Other uses in the food industry included coffee decaffeination and the preparation of flavoring extracts from hops and spices. Perhaps the greatest use of TCE has been as a degreaser for metal parts. The first known report of TCE in groundwater was given in 1949 by two English public chemists who described two separate instances of well contamination by industrial releases of TCE. Based on available federal and state surveys, between 9% to 34% of the drinking water supply sources tested in the U.S. may have some TCE contamination, though EPA has reported that most water supplies are in compliance with the maximum contaminant level (MCL) of 5 ppb. Trichloroethylene has been detected in 852 Superfund sites across the United States, according to the Agency for Toxic Substances and Disease Registry (ATSDR). Under the Safe Drinking Water Act of 1974, and as amended annual water quality testing is required for all public drinking water distributors. The EPA'S current guidelines for TCE are online. It should be noted that the EPA's table of "TCE Releases to Ground" is dated 1987 to 1993, thereby omitting one of the largest Superfund cleanup sites in the nation, the North IBW in Scottsdale, Arizona. Earlier, TCE was dumped here, and was subsequently detected in the municipal drinking water wells in 1982, prior to the study period. In 1988, the EPA discovered tons of TCE that had been leaked or dumped into the ground by the United States military and semiconductor industry (companies including Fairchild Semiconductor, Intel Corporation, and Raytheon Company) just outside NASA Ames in Moffett Field, Mountain View, California. The DoD has about 1,400 military properties nationwide that are contaminated with trichloroethylene. Marine Corps Base Camp Lejeune in North Carolina may be the largest TCE contamination site in the country. Legislation could force the EPA to establish a health advisory and a national public drinking water regulation to limit trichloroethylene. For over twenty years of operation, RCA Corporation had been pouring toxic wastewater into a well in its Taoyuan City, Taiwan facility. The pollution from the plant was not revealed until 1994, when former workers brought it to light. Investigation by the Taiwan Environmental Protection Administration confirmed that RCA had been dumping chlorinated organic solvents into a secret well and caused contamination to the soil and groundwater surrounding the plant site. High levels of TCE and tetrachloroethylene (PCE) can be found in groundwater drawn as far as two kilometers from the site. An organization of former RCA employees reports 1375 cancer cases, 216 cancer deaths, and 102 cases of various tumors among its members. The CDC states, "Trichloroethylene breaks down slowly in surface water and is removed mostly through evaporation to air. Trichloroethylene can slowly enter groundwater from contaminated surface water. Trichloroethylene is expected to remain in groundwater for long periods of time since it is not able to readily evaporate from groundwater."</p>
Dioxins	<p>By-product of high temperature processes, such as incomplete combustion and pesticide production. Dioxins are typically emitted from the burning of hospital waste, municipal waste, and hazardous waste, along with automobile emissions, peat, coal, and wood. Dioxins have been associated with several adverse effects in humans, including immune and enzyme disorders, chloracne, and are classified as a possible human carcinogen. In laboratory studies of dioxin effects an increase in birth defects and stillbirths, and lethal exposure have been associated with the substances. Food, particularly from animals, is the principal source of human exposure to dioxins.</p>
Polychlorinated dibenzofurans	<p>By-product of high-temperature processes, such as incomplete combustion after waste incineration or in automobiles, pesticide production, and polychlorinated biphenyl production. Structurally similar to dioxins, the two compounds share toxic effects. Furans persist in the environment and classified as possible human carcinogens. Human exposure to furans primarily results from food, particularly animal products.</p>

Chlordecone	Primarily used as an agricultural pesticide, related to DDT and Mirex. Chlordecone is toxic to aquatic organisms, and classified as a possible human carcinogen. Many countries have banned chlordecone sale and use, or intend to phase out stockpiles and wastes.
α -Hexachlorocyclohexane (α -HCH) and β -Hexachlorocyclohexane (β -HCH)	Insecticides as well as by-products in the production of lindane. Large stockpiles of HCH isomers exist in the environment. α -HCH and β -HCH are highly persistent in the water of colder regions. α -HCH and β -HCH has been linked Parkinson's and Alzheimer's disease.
Hexabromodiphenyl ether (hexaBDE) and heptabromodiphenyl ether (heptaBDE)	Main components of commercial octabromodiphenyl ether (octaBDE). Commercial octaBDE is highly persistent in the environment, whose only degradation pathway is through debromination and the production of bromodiphenyl ethers, which can increase toxicity.
Lindane	Pesticide used as a broad spectrum insecticide for seed, soil, leaf, tree and wood treatment, and against ectoparasites in animals and humans (head lice and scabies). Lindane rapidly bioconcentrates. It is immunotoxic, neurotoxic, carcinogenic, linked to liver and kidney damage as well as adverse reproductive and developmental effects in laboratory animals and aquatic organisms. Production of lindane produces as a by-product two other POPs α -HCH and β -HCH.
Pentachlorobenzene (PeCB)	Pesticide and unintentional byproduct. PeCB has also been used in PCB products, dyestuff carriers, as a fungicide, a flame retardant, and a chemical intermediate. PeCB is moderately toxic to humans, while highly toxic to aquatic organisms.
Tetrabromodiphenyl ether (tetraBDE) and pentabromodiphenyl ether (pentaBDE)	Industrial chemicals and the main components of commercial pentabromodiphenyl ether (pentaBDE). PentaBDE has been detected in humans in all regions of the world.
Perfluorooctanesulfonic acid (PFOS)	Used in the production of fluoropolymers. PFOS and related compounds are extremely persistent, bioaccumulating and biomagnifying. The negative effects of trace levels of PFOS have not been established.
Endosulfans	Insecticides to control pests on crops such coffee, cotton, rice and sorghum and soybeans, tsetse flies, ectoparasites of cattle. They are used as a wood preservative. Toxic to humans and aquatic and terrestrial organisms, linked to congenital physical disorders, mental retardation, and death. Endosulfans' negative health effects are primarily linked to its endocrine disrupting capacity acting as an antiandrogen.
Hexabromocyclododecane (HBCD)	A brominated flame retardant primarily used in thermal insulation in the building industry. HBCD is persistent, toxic and ecotoxic, with bioaccumulative and long-range transport properties.
Polycyclic aromatic hydrocarbons (PAHs)	<p>Polycyclic aromatic hydrocarbons (PAHs) are a group of more than 100 different chemicals that are released from burning coal, oil, gasoline, trash, tobacco, wood, or other organic substances such as charcoal-broiled meat. They are also called polynuclear aromatic hydrocarbons. They can occur naturally when they are released from wildfires and volcanoes and can be manufactured. Other activities that release PAHs include driving, agricultural burning, roofing or working with coal tar products, sound- and water-proofing, coating pipes, steelmaking, and paving with asphalt. PAHs are persistent organic pollutants (POPs).</p> <p>Manufactured PAHs are colorless, white, or pale yellow solids. Some can take the form of needles, plates, crystals, or prisms. PAHs are found in the asphalt that covers roads and parking lots and in smoke and soot. They are also found in coal tar, coal tar pitch, and creosotes, which are by-products of distilling and heating coal and some woods. Coal tar products are used in medicines for skin diseases, such as psoriasis, and in insecticides, fungicides, and pesticides. Coal tar creosote is widely used for wood preservation. Coal tar and coal tar pitch are used for roofing, road paving, aluminum smelting, and production of coke, a coal residue used as fuel. Some PAHs are used to make medicines, dyes, plastics, and pesticides.</p>
Perfluorotributylamine (PFTBA), or FC43	This compound is produced by the electronic industry, along with other perfluoroalkyl amines. It is used as an ingredient in Fluosol and in some Fluorinert coolant liquids. In 2013, this liquid was shown by researchers at the University of Toronto to be a greenhouse gas, with warming properties more than 7,000 times that of carbon dioxide over a 100 year period, and that, as such, it is the most potent greenhouse gas ever discovered. The researchers also reported that the gas can persist in the atmosphere for up to 500 years.
Perfluorooctanoic acid (PFOA) or C8	Perfluorooctanoic acid (PFOA), also known as C8, is a synthetic perfluorinated carboxylic acid and fluorosurfactant. One industrial application is as a surfactant in the emulsion polymerization of fluoropolymers. It has been used in the manufacture of such prominent consumer goods as

	<p>polytetrafluoroethylene (commercially known as Teflon). PFOA has been manufactured since the 1940s in industrial quantities. PFOA persists indefinitely in the environment. It is a toxicant and carcinogen in animals. PFOA has been detected in the blood of more than 98% of the general US population in the low and sub-parts per billion range, and levels are higher in chemical plant employees and surrounding subpopulations. How general populations are exposed to PFOA is not completely understood. PFOA has been detected in industrial waste, stain resistant carpets, carpet cleaning liquids, house dust, microwave popcorn bags, water, food, some cookware and PTFE such as Teflon. As a result of a class-action lawsuit and community settlement with DuPont, three epidemiologists conducted studies on the population surrounding a chemical plant that was exposed to PFOA at levels greater than in the general population. The studies concluded that there was probably an association between PFOA exposure and six health outcomes: kidney cancer, testicular cancer, ulcerative colitis, thyroid disease, hypercholesterolemia (high cholesterol), and pregnancy-induced hypertension. The primary manufacturer of PFOs – 3M (known as Minnesota Mining and Manufacturing Company from 1902 to 2002) – began a production phase-out in 2002 in response to concerns by the United States Environmental Protection Agency. Eight other companies agreed to gradually phase them out by 2015.</p> <p>PFOA contaminates every continent. PFOA has been detected in the central Pacific Ocean at low parts per quadrillion ranges, and at low parts per trillion levels in coastal waters. Due to the surfactant nature of PFOA, it has been found to concentrate in the top layers of ocean water. PFOA is detected widely in surface waters, and is present in numerous mammals, fish, and bird species. PFOA is in the blood or vital organs of Atlantic salmon, swordfish, striped mullet, gray seals, common cormorants, Alaskan polar bears, brown pelicans, sea turtles, sea eagles, Midwestern bald eagles, California sea lions and Laysan albatrosses on Sand Island, a wildlife refuge on Midway Atoll, in the middle of the North Pacific Ocean, about halfway between North America and Asia. However, wildlife has much less PFOA than humans, unlike PFOS and other longer perfluorinated carboxylic acids; in wildlife, PFOA is not as bioaccumulative as longer perfluorinated carboxylic acids.</p> <p>Most industrialized nations have average PFOA blood serum levels ranging from 2 to 8 parts per billion; the highest consumer sub-population identified was in Korea—with about 60 parts per billion. In Peru, Vietnam, and Afghanistan blood serum levels have been recorded to be below one part per billion. In 2003–2004 99.7% of Americans had detectable PFOA in their serum with an average of about 4 parts per billion, and concentrations of PFOA in US serum have declined by 25% in recent years. Despite a decrease in PFOA, the longer perfluorinated carboxylic acid PFNA is increasing in the blood of US consumers.</p> <p>PFOA is a carcinogen, a liver toxicant, a developmental toxicant, and an immune system toxicant, and also exerts hormonal effects including alteration of thyroid hormone levels. Animal studies show developmental toxicity from reduced birth size, physical developmental delays, endocrine disruption, and neonatal mortality. PFOA alters lipid metabolism. It is an agonist of PPARα and is a peroxisome proliferator in rodents contributing to a well understood form of oxidative stress. Humans are considered less susceptible to peroxisome proliferation than rodents. However, PFOA has been found to be a liver carcinogen in rainbow trout via a potential estrogenic mechanism, which may be more relevant to humans.</p>
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Fertilizers and the Nitrogen and Phosphorus Cycles

Many of the indigenous *Homo sapiens* around the world practiced, and some still do practice, a type of permaculture, which is a very different method of agriculture working with nature instead of against it. Their methods do not involve the use of fertilizers or pesticides, and when they practice monoculture it is done in a responsible manner as not to overtax the land. Shade grown coffee which provides a habitat for species diversity for plants, insects, birds, and mammals as well as biotic processes such as pest control and pollination while also helping in abiotic processes with soil erosion and water retention is a good example of a permaculture or agroforestry alternative to monoculture. Many past societies did not practice monoculture, they worked with nature using it to their advantage. Theodora Kroeber described the agricultural method of the California indigenous as,

“The Indians did no planting, being, hunters, gatherers, and harvesters of grains and seeds and fruits and roots which grew wild in their natural habitat and uncultivated state-diggers if you will...but like the people of ancient Egypt, by dropping the

seeds of corn and beans and squash into the red ooze exposed by the seasonal flooding and retreat of the river, and allowing the crops to grow under the blazing sun with a minimum of attention from the planters.” (95)

And J. Eric S. Thompson in describing the Maya process for agriculture as,

“Early in the year the Maya makes a clearing of about ten acres with axe and machete. Burning off the felled trees as soon as they are dry, he plants the seeds in holes dug with a pointed pole in the ash-covered soil just before the rains in early May. Milpas are allowed to revert to forest usually after two seasons (the Maya say that they get too weed-ridden after that to work again and the yield also drops), and a new section of forest is cleared.” (3)

As a result of modern-day monoculture, many of the soils used for agriculture have been over-exploited and now require fertilizer inputs to offset nutrient exports in harvested food products. The nitrogen and phosphorus cycles of Earth have become unbalanced from anthropogenic activities, mainly from the use of fertilizers in agriculture. In an attempt to correct this, the Haber-Bosch process is employed to produce fertilizers, and it has been used for more than 100 years. It has led to not only a heavy dependence on fertilizers, but increased use, and also resulted in enormous environmental damage as well. Semoka wrote,

“The yield of intensive agriculture is virtually always limited by the availability of the nitrogen needed to produce the proteins in living cells. Natural sources provide only about half the global N requirement in agriculture, and we are completely reliant on inorganic nitrogen fertilizers for the rest. Smil (1999) points out that of all the technological inventions of the 20th century, the Haber-Bosch process has made the most difference to the survival of humanity. This is the industrial technique that is used to synthesize nitrogen fertilizer using the atmosphere as nitrogen source. Smil (2001) claims that approximately 40% of the world’s dietary protein supply in the mid-1990s originated from fertilizer produced in this way. The Haber-Bosch technique, though improved and more energy efficient nowadays, is still recognizably the process that first went into commercial production to convert atmospheric nitrogen into ammonia, just before the First World War began.

Without the Haber-Bosch synthesis of ammonia, almost two-fifths of the world’s population would not be here – and our dependence will only increase as the global count moves from six to nine or ten billion people.

A major problem arises from the fact that the efficiency with which organisms pick up nitrogen in the soil is low (generally in the range 25 to 50%), with the excess leached and washed from the soil predominantly as nitrate. The resulting massive introduction of nitrogen into the natural system creates problems in a wide variety of terrestrial and marine ecosystems. Eutrophication, recognized as an endemic problem in the surface waters of agricultural areas of the developed world in the 1960s and 1970s, has now extended to the marine environment, causing hypoxia (so called “dead zones”) in near shore waters. The most notorious extends for about 500 kilometers along the shore of the Gulf of Mexico, where the Mississippi brings nitrates and phosphates from the agricultural hinterland to fertilize algal growth (Figure N7). Decomposition of the algae deoxygenates the water and leads to the death of aquatic species.

Excess nitrate may also contaminate groundwater. In southern Ontario, Canada, for example a third of the rural drinking water resource is contaminated in this way, and potentially threatens the occurrence of methaemoglobinaemia or blue baby syndrome. This is a rare condition that prevents red blood corpuscles from transporting in an affected child.

Finally, nitrogen in oxidized form may remain in the atmosphere to cause smog, or, by dissolving in atmospheric precipitation, to produce acid rain.” (13)

Most of this phosphorus ends up as waste and ultimately ends up polluting the rivers and oceans, Soon states that,

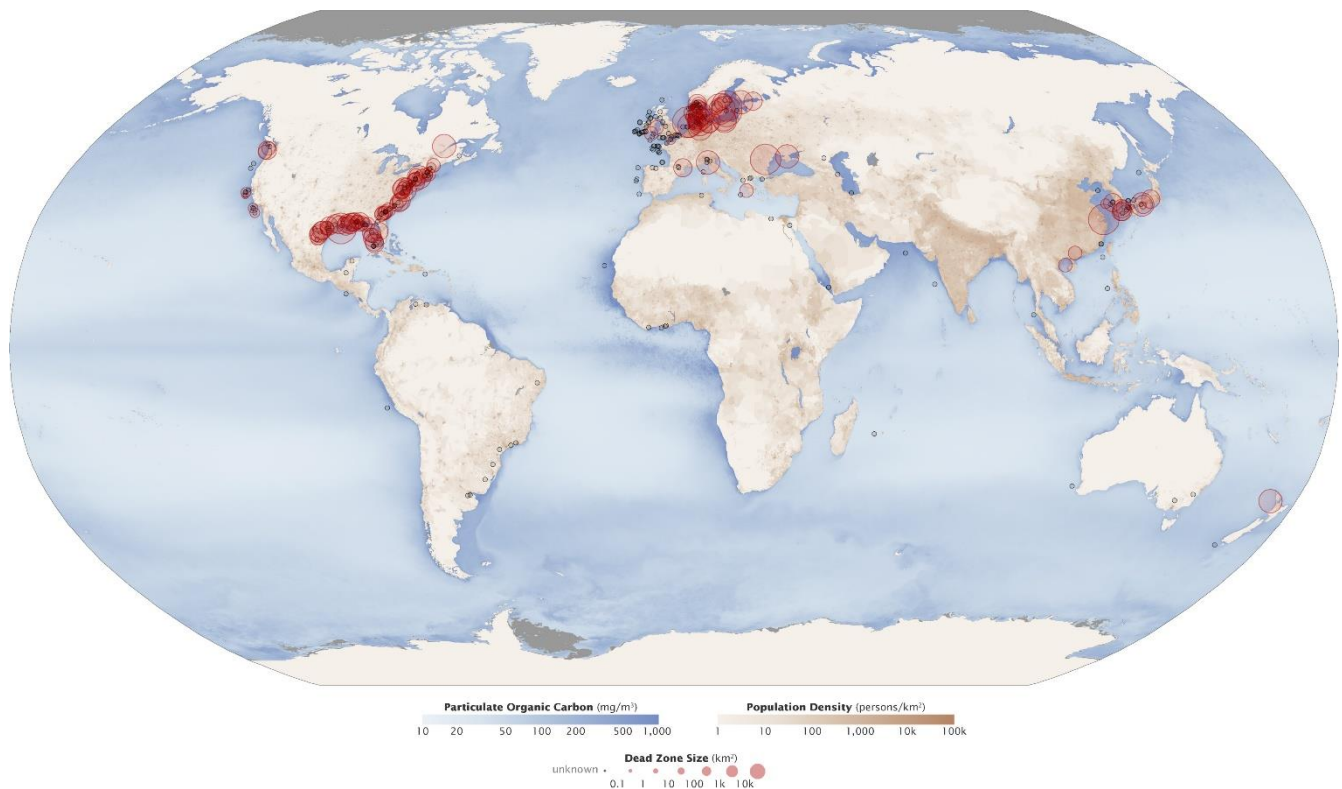
“The bulk of P removed from agricultural production systems eventually ends up as waste products, which are discharged into the environment. The concentration of human population in urban centers, and of livestock production, aggravates the waste recycling problem. There are opportunities, not unlimited however, for recycling waste product P by land utilization and for its proper stewardship.”

“Superimposed on the natural cycle is human influence such as the mining and consumption of phosphates by society, and the release of P in domestic and industrial effluents. It has been estimated that globally about half of the 17 Tg P yr⁻¹ carried to the oceans is derived from natural sources and the other half is dumped into rivers from human activities. The benefits of human influence on the P cycle to agriculture are obvious and the drawbacks to some aquatic ecosystems may be equally obvious.” (14)

Through science and technology *Homo sapiens* have expanded irrigated croplands, and thus the use of fresh water for agriculture has also increased. A 2015 United Nations Food and Agriculture Organization report stated,

"The area of irrigated croplands has doubled in the last 50 years and irrigation now accounts for 70 percent of all water diversions on the planet. Irrigated areas account for 34 percent of crop production, yet only cover 24 percent of all cropland area." (472)

With this increase in irrigated croplands, there has also been even more contamination of the Earth's hydrosphere from the excessive use of fertilizers and pesticides. All the excess fertilizer used in agriculture which is not consumed by the plant eventually ends up as runoff into streams and rivers, and ultimately flows into the ocean. Nitrogen and phosphorus used in fertilizers creates cyanobacteria or algal blooms, which then deplete oxygen levels in the water and leads to 'dead zones' in which no life can live. Sewage runoff and industrial dumping of toxic chemicals also contribute to the eutrophication. Since at least the middle of the 20th century, deoxygenation has been occurring in both the open ocean and coastal waters. Globally, there were less than 50 waterbodies in the 1960's which had recorded and published accounts of hypoxia, by 2008 this number increased to about 400. In the United States, 307 of 647 estuarine ecosystems have hypoxia. (542) Research in 2011 done by the World Resources Institute and the Virginia Institute of Marine Science identified more than 530 dead zones worldwide and found 228 other areas that exhibited signs of marine eutrophication. (469) In some countries around the world there are a variety of toxic chemicals that are purposefully dumped into the rivers or streams, with the erroneous notion that they will simply wash away into the ocean and that the large amount of water will dilute the toxic chemical enough so that it poses no further direct danger. But initially, these chemicals can affect the aquatic ecosystems they pass through destroying flora and fauna which inhabit these ecosystems including the shoreline, and eventually these toxic chemicals reach the Earth's oceans polluting coastal areas and even the ocean depths. Would there not be less water and soil pollution and less soil erosion if hydroculture, greenhouses, roof-top gardens, and terrariums were used for agriculture, instead of the predominant land-based method?



SOURCE: NASA - Ocean dead zones highlighted in red. - <http://m.earthobservatory.nasa.gov/IOTD/view.php?id=44677>

Weeds and Pests

Homo sapiens classify some flora as weeds or undesirable for one reason or another, and then attempt to

eradicate them by playing God purely for aesthetic reasons. Take the edible dandelion for instance, a beautiful species of flora with a yellow flower which feeds many different species of insects, yet when some *Homo sapiens* see this flora species growing on the land surrounding their dwelling they barbarically rip it from the ground by the roots or spray it with a toxic herbicide. Other *Homo sapiens* attempt to control flora by killing aphids or other insects which naturally either coexist with or feed on the flora. Many *Homo sapiens* view ants, cockroaches, rodents, and other faunae which clean up the waste left behind by *Homo sapiens* as pests, spraying unnatural toxic chemicals to rid themselves of these so-called pests. Perhaps if one would simply change their living habits and become more organized and clean, pests would not be as much of an issue, or one could choose to simply coexist with nature and accept the fact that they are a sloven type individual and allow nature to help them.

Building owners now fumigate entire buildings using tents in an effort to suffocate and poison faunae deemed as pests. Some of the chemicals that have been used to fumigate buildings are: Methyl bromide, 1,3-dichloropropene, dazomet (methyl isothiocyanate precursor), chloropicrin, DBCP (banned worldwide), formaldehyde, hydrogen cyanide, iodoform, methyl isocyanate, phosphine, and sulfuryl fluoride. Americans spent \$14,000,000,000 in 2016 on professional pest control services in a futile attempt to mainly control ants, cockroaches, and termites. (157) How many millions of gallons of insecticides are sprayed on residential and commercial buildings? How much of these insecticides are washed away into the water supply when it rains or when a building is cleaned? How much remains to potentially harm the human inhabitants of the building? How many other insects are killed unintentionally as a result of these pesticides? Do *Homo sapiens* have such severe entomophobia that they are willing subject their living area and personal belongings to such toxic chemicals?

Pesticides (fungicides, herbicides, insecticides, algicides, molluscicides, miticides and rodenticides)

In 2007, the world dumped 5,200,000,000 pounds of pesticides onto the Earth's surface, and between 1970 and 2007 the United States alone used 36,244,000,000 pounds of pesticides. (228) In the United States, the EPA has registered more than 18,000 pesticides which also kill an estimated 72,000,000 birds each year. (371) Pesticides are not selective in their extermination and kill not only the unwanted flora or fauna species, but also many other non-target species during the process. How many trillions of insects have been killed by electric bug zappers since they were invented around 1911? How many billions of gallons of synthetically created pesticides have been dumped onto the Earth's surface over the last 100 years? How many trillions of flora and fauna species have perished as a result of these toxic chemicals? How many pesticides were used not for agriculture, but for an aesthetically pleasing space around a dwelling? Pesticide residue has also been found on a large amount of fresh produce and can be ingested when the food is consumed. The Environmental Working Group states that,

“...EWG's analysis of tests by the U.S. Department of Agriculture found that nearly 70 percent of samples of 48 types of conventionally grown produce were contaminated with pesticide residues. The USDA found a total of 178 different pesticides and pesticide breakdown products on the thousands of produce samples it analyzed. The pesticides persisted on fruits and vegetables even when they were washed and, in some cases, peeled.” (253)

**World and U.S. Amount of Pesticide Active Ingredient Used
by Pesticide Type, 2006 and 2007 Estimates**

Year and Pesticide Type	World Market		U.S. Market		U.S. Percentage of World Market
	Mil lbs	%	Mil lbs	%	
2006					
Herbicides ¹	2,018	39	498	44	25
Insecticides	955	18	99	9	10
Fungicides	519	10	73	6	14
Other ²	1,705	33	457	41	27
Total	5,197	100	1,127	100	22
2007					
Herbicides ¹	2,096	40	531	47	25
Insecticides	892	17	93	8	10
Fungicides	518	10	70	6	14
Other ²	1,705	33	439	39	26
Total	5,211	100	1,133	100	22

Note: Totals may not add due to rounding. Does not include wood preservatives, specialty biocides, and chlorine/hypochlorites.

Source: EPA estimates based on Cropnosis Limited (www.cropnosis.com), USDA/NASS (www.nass.usda.gov), and EPA proprietary data.

1. "Herbicides" include herbicides and plant growth regulators.

2. "Other" includes nematocides, fumigants, and other miscellaneous conventional pesticides, and other chemicals used as pesticides such as sulfur, petroleum oil, and sulfuric acid.

SOURCE: EPA - Pesticides Industry Sales and Usage 2006 and 2007 Market Estimates

In June 2013, Oregon landscapers sprayed blooming linden trees with a pesticide named Safari in an attempt to kill aphids, but resulted in the death of more than 25,000 bees. (154) The use of pesticides is a self-destructive and pointless effort made in an attempt to attain the unachievable goal of dominating nature. Pesticides are not selective in what they kill, every organism on Earth which is susceptible to them will be negatively impacted and many will die. Monoculture is one of the main reason why pesticides even need to be used, and if agricultural methods were to change by simply planting a diverse group of florae following nature's example, perhaps there would be no need for toxic pesticides Could more organic natural alternatives be used instead? Instead of using toxic pesticides, would it not be more natural and logical to allow and encourage native dragonflies, damselflies, robberflies, bats, arachnids, frogs, and other natural predators of the unwanted faunae? Rachel Carson wrote,

"They should not be called 'insecticides', but 'biocides'. The whole process of spraying seems caught up in an endless spiral. Since DDT was released for civilian use, a process of escalation has been going on in which ever more toxic materials must be found. This has happened because insects, in a triumphant vindication of Darwin's principle of the survival of the fittest, have evolved super races immune to the particular insecticide used, hence a deadlier one has always to be developed—and then a deadlier one than that. It has happened also because, for reasons to be described later, destructive insects often undergo a 'flareback', or resurgence, after spraying, in numbers greater than before. Thus the chemical war is never won, and all life is caught in its violent crossfire.

Future historians may well be amazed by our distorted sense of proportion. How could intelligent beings seek to control a few unwanted species by a method that contaminated the entire environment and brought the threat of disease and death even to their own kind?

It is a sobering fact, however, as we shall presently see, that the method of massive chemical control has had only limited success, and also threatens to worsen the very conditions it is intended to curb.

Under primitive agricultural conditions the farmer had few insect problems. These arose with the intensification of agriculture—the devotion of immense acreages to a single crop. Such a system set the stage for explosive increases in specific insect populations. Single-crop farming does not take advantage of the principles by which nature works; it is agriculture as

an engineer might conceive it to be. Nature has introduced great variety into the landscape, but man has displayed a passion for simplifying it. Thus he undoes the built-in checks and balances by which nature holds the species within bounds. One important natural check is a limit on the amount of suitable habitat for each species. Obviously then, an insect that lives on wheat can build up its population to much higher levels on a farm devoted to wheat than on one in which wheat is intermingled with other crops to which the insect is not adapted. The same thing happens in other situations. A generation or more ago, the towns of large areas of the United States lined their streets with the noble elm tree. Now the beauty they hopefully created is threatened with complete destruction as disease sweeps through the elms, carried by a beetle that would have only limited chance to build up large populations and to spread from tree to tree if the elms were only occasional trees in a richly diversified planting.” (16)

Over the last 75 years, there have been thousands of pesticides created from various synthetic chemical combinations which were tested or used and deemed to be too lethal for direct environmental use and were subsequently abandoned or used for another purpose. Nature has many natural pesticides which some think could possibly be used instead of the synthetically toxic ones which are made in a lab. Glenn King at the University of Queensland has been studying spider venom to isolate the specific compounds which are lethal to insects. The spider venom has hundreds of compounds, many of which are not toxic to vertebrates but are lethal to insects. These natural compounds could potentially be the basis for very effective natural insecticides. But is a natural insecticide the solution, or is simply not using any pesticides at all and the answer is simply working with nature instead of against it? A pesticide, whether created synthetically in a lab or from something made within nature will always have the potential to disrupt the balance of an ecosystem by attempting to influence and control it.

There is much scientific debate about the negative effects of pesticides, and most have been proven to cause some sort of negative impacts to either *Homo sapiens* health or the environment. When monoculture is practiced combined with the overuse of fertilizers, it creates an environment where specific species can and do thrive, and in response *Homo sapiens* solution is to use more pesticides in an attempt to counteract this. If conditions are right for a specific species it will thrive and dominate an ecosystem, this is something that usually does not happen too often or for an extended period of time in the natural world, as nature keeps everything balanced. Although there are often large colonies or clusters of florae, nature does not grow just a single flora species anywhere on Earth, there is always biodiversity and this biodiversity helps to keep a balance in the ecosystems. Given enough time the florae and faunae which have been deemed pests, will usually adapt and become immune to the toxic chemicals being used to exterminate them. There are currently over 125 known mosquito species which have a documented resistance to one or more insecticides, demonstrating once again that nature can and will evolve around *Homo sapiens* attempts to control it using toxic chemicals. (431) This is evolution through the process of adaptation, and it will occur until the species is either extinct or has adapted to the negative changes in the environment. This is precisely why nature will always elude anthropogenic efforts to control it, either through adaptation or even extinction. Not only is it barbaric and irresponsible to use pesticides, it is idiotic to think that nature will ever be controlled by *Homo sapiens*. Rachel Carson wrote,

"Life is a miracle beyond our comprehension, and we should reverence it even where we have to struggle against it...The resort to weapons such as insecticides to control it is a proof of insufficient knowledge and of an incapacity so to guide the processes of nature that brute force becomes unnecessary. Humbleness is in order; there is no excuse for scientific conceit here."

"Through all these new, imaginative, and creative approaches to the problem of sharing our earth with other creatures there runs a constant theme, the awareness that we are dealing with life—with living populations and all their pressures and counter-pressures, their surges and recessions. Only by taking account of such life forces and by cautiously seeking to guide them into channels favorable to ourselves can we hope to achieve a reasonable accommodation between the insect hordes and ourselves.

The current vogue for poisons has failed utterly to take into account these most fundamental considerations. As crude a weapon as the cave man's club, the chemical barrage has been hurled against the fabric of life—a fabric on the one hand delicate and destructible, on the other miraculously tough and resilient, and capable of striking back in unexpected ways. These extraordinary capacities of life have been ignored by the practitioners of chemical control who have brought to their task no 'high-minded orientation', no humility before the vast forces with which they tamper. The 'control of nature' is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man. The concepts and practices of applied entomology for the most part date from that Stone Age of science. It is our alarming misfortune that so primitive a science has armed itself with the most modern and terrible

weapons, and that in turning them against the insects it has also turned them against the earth." (618)

Some of the Pesticides Invented	
Pesticide	Description
2,4-D	A broadleaf herbicide in the phenoxy group used in turf and no-till field crop production. Now, it is mainly used in a blend with other herbicides to allow lower rates of herbicides to be used; it is the most widely used herbicide in the world, and third most commonly used in the United States. It is an example of synthetic auxin (plant hormone).
Aminopyralid	A broadleaf herbicide in the pyridine group, used to control weeds on grassland, such as docks, thistles and nettles. It is notorious for its ability to persist in compost.
Atrazine	A triazine herbicide, is used in corn and sorghum for control of broadleaf weeds and grasses. Still used because of its low cost and because it works well on a broad spectrum of weeds common in the US corn belt, atrazine is commonly used with other herbicides to reduce the overall rate of atrazine and to lower the potential for groundwater contamination; it is a photosystem II inhibitor.
Chlorpyrifos	<p>Chlorpyrifos (CPS), sold under many brandnames, is an organophosphate pesticide used to kill a number of pests including insects and worms. It is used on crops, animals, and buildings. It was introduced in 1965 by Dow Chemical Company. It acts on the nervous system of insects by inhibiting acetylcholinesterase. Toxicity results in more than 10,000 human deaths a year. Chlorpyrifos is considered moderately hazardous to humans by the World Health Organization. Exposure surpassing recommended levels has been linked to neurological effects, persistent developmental disorders and autoimmune disorders. Exposure during pregnancy may harm the mental development of children, and most home use was banned in 2001 in the U.S. In agriculture, it is "one of the most widely used organophosphate insecticides" in the United States, and before being phased out for residential use was one of the most used residential insecticides. On March 29, 2017, EPA Administrator Scott Pruitt denied a petition to ban chlorpyrifos.</p> <p>Chlorpyrifos is used around the world to control insects in agricultural, residential and commercial settings. Its use in residential applications is restricted in multiple countries. According to Dow, chlorpyrifos is registered for use in nearly 100 countries and is annually applied to approximately 8.5 million crop acres. The crops with the most use are cotton, corn, almonds and fruit trees including oranges, bananas and apples. Chlorpyrifos was first registered for use in the United States in 1965 for control of foliage and soil-born insects. The chemical became widely used in residential settings, on golf course turf, as a structural termite control agent, and in agricultural use. Most residential use has been phased out in the United States; however it remains a common agricultural insecticide.</p> <p>EPA estimated that between 1987 and 1998 about 21 million pounds of chlorpyrifos were annually used in the US. In 2007, chlorpyrifos was the most commonly used organophosphate pesticide in the United States, with an estimated 8 to 11 million pounds applied, and the 14th most common agricultural pesticide ingredient overall in 2007 in the United States. Acute poisoning is probably most common in agricultural areas in Asia, where many small farmers are affected. Poisoning may be due to occupational or accidental exposure or intentional self-harm. Precise numbers of chlorpyrifos poisonings globally are not available. Pesticides are used in an estimated 200,000+ suicides annually with 10s of thousands due to chlorpyrifos. Organophosphates are thought to constitute two thirds of ingested pesticides in rural Asia. Chlorpyrifos is among the commonly used pesticides used for self-harm. In the US, the number of incidents of chlorpyrifos exposure reported to the US National Pesticide Information Center shrank sharply from over 200 in the year 2000 to less than 50 in 2003, following the residential ban.</p> <p>In 2011, EPA estimated that, in the general US population, people consume 0.009 micrograms of chlorpyrifos per kilogram of their body weight per day directly from food residue. Children are estimated to consume a greater quantity of chlorpyrifos per unit of body weight from food residue, with toddlers the highest at 0.025 micrograms of chlorpyrifos per kilogram of their body weight per day. People may also ingest chlorpyrifos from drinking water or from residue in food handling establishments. The EPA's acceptable daily dose is 0.3 micrograms/kg/day. Before residential use was restricted in the US, data from 1999-2000 in the national NHANES study detected the metabolite TCPy in 91% of human urine samples tested. In samples collected between 2007 and 2009 from families living in Northern California, TCPy was found in 98.7% of floor wipes tested and in 65% of urine samples tested. For both children and adults, the average concentrations of TCPy in urine were lower in the later study. A 2008 study found dramatic drops in the urinary levels of chlorpyrifos metabolites when children in the general population switched from conventional to organic diets.</p>

	<p>Certain populations with higher likely exposure to chlorpyrifos, such as people who apply pesticides, work on farms, or live in agricultural communities, have been measured in the US to excrete TCPy in their urine that are 5 to 10 times greater than levels in the general population. Air monitoring studies conducted by the California Air Resources Board (CARB) documented chlorpyrifos in the air of California communities. Analyses indicate that children living in areas of high chlorpyrifos use are often exposed to levels that exceed EPA dosages. Advocacy groups monitored air samples in Washington and Lindsay, California, in 2006 with comparable results. Grower and pesticide industry groups argued that the air levels documented in these studies are not high enough to cause significant exposure or adverse effects, but a follow-up biomonitoring study in Lindsay showed that people there display above-normal chlorpyrifos levels.</p>
Clopyralid	A broadleaf herbicide in the pyridine group, used mainly in turf, rangeland, and for control of noxious thistles. Notorious for its ability to persist in compost, it is another example of synthetic auxin.
Dicamba	A postemergent broadleaf herbicide with some soil activity, is used on turf and field corn. It is another example of a synthetic auxin.
Glufosinate ammonium	A broad-spectrum contact herbicide, is used to control weeds after the crop emerges or for total vegetation control on land not used for cultivation.
Fluazifop (Fuselade Forte)	A post emergence, foliar absorbed, translocated grass-selective herbicide with little residual action. It is used on a very wide range of broad leaved crops for control of annual and perennial grasses.
Fluroxypyr	A systemic, selective herbicide, is used for the control of broad-leaved weeds in small grain cereals, maize, pastures, rangeland and turf. It is a synthetic auxin. In cereal growing, fluroxypyr's key importance is control of cleavers, Galium aparine. Other key broadleaf weeds are also controlled.
Glyphosate	A systemic nonselective herbicide, is used in no-till burndown and for weed control in crops genetically modified to resist its effects. It is an example of an EPSPs inhibitor.
Imazapyr	A nonselective herbicide, is used for the control of a broad range of weeds, including terrestrial annual and perennial grasses and broadleaf herbs, woody species, and riparian and emergent aquatic species.
Imazapic	A selective herbicide for both the pre- and postemergent control of some annual and perennial grasses and some broadleaf weeds, kills plants by inhibiting the production of branched chain amino acids (valine, leucine, and isoleucine), which are necessary for protein synthesis and cell growth.
Imazamox	An imidazolinone manufactured by BASF for postemergence application that is an acetolactate synthase (ALS) inhibitor. Sold under trade names Raptor, Beyond, and Clearcast.
Linuron	A nonselective herbicide used in the control of grasses and broadleaf weeds. It works by inhibiting photosynthesis.
MCPA (2-methyl-4-chlorophenoxyacetic acid)	A phenoxy herbicide selective for broadleaf plants and widely used in cereals and pasture.
Metolachlor	A pre-emergent herbicide widely used for control of annual grasses in corn and sorghum; it has displaced some of the atrazine in these uses.
Paraquat	A nonselective contact herbicide used for no-till burndown and in aerial destruction of marijuana and coca plantings. It is more acutely toxic to people than any other herbicide in widespread commercial use.
Pendimethalin	A pre-emergent herbicide, is widely used to control annual grasses and some broad-leaf weeds in a wide range of crops, including corn, soybeans, wheat, cotton, many tree and vine crops, and many turfgrass species.
Picloram	A pyridine herbicide, mainly is used to control unwanted trees in pastures and edges of fields. It is another synthetic auxin.
Sodium chlorate	A nonselective herbicide, is considered phytotoxic to all green plant parts. It can also kill through root absorption. (disused/banned in some countries)
Triclopyr	A systemic, foliar herbicide in the pyridine group, is used to control broadleaf weeds while leaving grasses and conifers unaffected.
Dichlorodiphenyldichloroethane	Dichlorodiphenyldichloroethane (DDD) is an organochlorine insecticide that is slightly irritating to the skin. DDD is a metabolite of DDT. DDD is colorless and crystalline; it is closely related chemically and is similar in properties to DDT, but it is considered to be less toxic to animals than DDT. DDD is in the "Group B2" classification, meaning that it is a probable human carcinogen. This is based on an increased incidence of lung tumors in male and female mice, liver tumors in male mice,

	<p>and thyroid tumors in male rats. Further basis is that DDD is so similar to and is a metabolite of DDT, another probable human carcinogen. DDD is no longer registered for agricultural use in the United States, but the general population continues to be exposed to it due to its long persistence time. The primary source of exposure is oral ingestion of food.</p> <p>Clear Lake is well-known among entomologists for the Clear Lake gnat (<i>Chaoborus astictopus</i>) and historical control efforts. This species of "phantom midge" (so called because the larvae are transparent and very difficult to see) measures less than 1/4" long and resembles a tiny mosquito, but is non-biting. Clear Lake gnat hatches start anytime from March through June, depending on weather. Before pesticide use began in the 1940s (Refer to Rachel Carson's book <i>Silent Spring</i>, chapter 4), the gnat was so abundant around the lake in the summer that large piles of dead gnats appeared beneath streetlights, looking like dirty snow. The gnat swarms were so thick that people driving along the edge of the lake reported stopping every 1/4 mile to clean off the gnats off the windshields and headlights of their cars so they could see, and pedestrians tied kerchiefs over their faces to avoid inhaling the gnats. In 1949, as part of an effort to boost tourism and improve the local economy, DDD (dichlorodiphenyldichloroethane) was applied to the lake in heavy doses to eradicate the gnats that were driving summer tourists away from the lake. The treatment succeeded in controlling the gnats that year and for the following year, however in 1953 the gnat population rebounded, prompting another application in 1954. The final application of DDD to Clear Lake was made in 1957 (Cook 1963). Numbers of western grebe were found dead, their tissues containing high concentrations of DDD. The effects were devastating to the local ecology. From 1962 to 1975 carefully planned applications of methyl parathion were made for Clear Lake gnat control. The gnat still occurs in Clear Lake, but at much lower numbers than in the 1940s-1970s. The Clear Lake gnat's population is believed to be kept in check now by two introduced fish species (the threadfin shad and the inland silverside) that compete with the Clear Lake gnat for its preferred zooplankton for food.</p>
Sulfonylureas	Several sulfonylureas, including Flazasulfuron and Metsulfuron-methyl, which act as ALS inhibitors and in some cases are taken up from the soil via the roots.
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	Was a widely used broadleaf herbicide until being phased out starting in the late 1970s. While 2,4,5-T itself is of only moderate toxicity, the manufacturing process for 2,4,5-T contaminates this chemical with trace amounts of 2,3,7,8-tetrachlorodibenzop-dioxin (TCDD). TCDD is extremely toxic to humans. With proper temperature control during production of 2,4,5-T, TCDD levels can be held to about .005 ppm. Before the TCDD risk was well understood, early production facilities lacked proper temperature controls. Individual batches tested later were found to have as much as 60 ppm of TCDD. 2,4,5-T was withdrawn from use in the USA in 1983, at a time of heightened public sensitivity about chemical hazards in the environment. Public concern about dioxins was high, and production and use of other (non-herbicide) chemicals potentially containing TCDD contamination was also withdrawn. These included pentachlorophenol (a wood preservative) and PCBs (mainly used as stabilizing agents in transformer oil). Some feel that the 2,4,5-T withdrawal was not based on sound science. 2,4,5-T has since largely been replaced by dicamba and triclopyr.
Agent Orange	<p>In 1951, biological warfare scientists at Fort Detrick, Maryland began investigating defoliants based upon Galston's Ph.D. discoveries with TIBA. They eventually produced the toxic defoliant Agent Orange used by the British Air Force during the Malayan Emergency and the U.S. Air Force during the Vietnam War.</p> <p>Galston was deeply affected by this development of his research. In 1972, he described his viewpoint: "I used to think that one could avoid involvement in the antisocial consequences of science simply by not working on any project that might be turned to evil or destructive ends. I have learned that things are not all that simple, and that almost any scientific finding can be perverted or twisted under appropriate societal pressures. In my view, the only recourse for a scientist concerned about the social consequences of his work is to remain involved with it to the end. His responsibility to society does not cease with publication of a definitive scientific paper. Rather, if his discovery is translated into some impact on the world outside the laboratory, he will, in most instances, want to follow through to see that it is used for constructive rather than anti-human purposes.... Science is now too potent in transforming our world to permit random fallout of the social consequences of scientific discoveries. Some scrutiny and regulation are required, and I believe that scientists must play an important role in any bodies devised to carry out such tasks."</p> <p>While the United States government argued that herbicides like Agent Orange did not qualify as chemical weapons, Galston asserted that their use was a violation of the United Nations Resolution of December 5, 1966 against the wartime use of "asphyxiating, poisonous or other gases" and "analogous liquids, materials or devices". He was clear about the devastating impact of their use on the environment, and warned of the likelihood that they were harmful to animals and humans as well as plants. Galston visited Vietnam and China, viewing the environmental damage in Vietnam first-</p>

	<p>hand: "The complex mangrove community lining the estuaries is virtually completely killed by a single spray with agent Orange and regeneration takes several decades, at least... The complete killing of the mangroves is certain to have a major effect on the ecology of the estuarine zone... The ecological and social effects of our massive use of herbicides have not been properly evaluated, and it is doubtful that they ever will be."</p> <p>Beginning in 1965, Galston lobbied both his scientific colleagues and the government to stop using Agent Orange. Galston and U.S. geneticist Matthew S. Meselson appealed to the U. S. Department of Defense to investigate the human toxicology of Agent Orange. The research conducted by the Department of Defense led to the discovery that Agent Orange caused birth defects in laboratory rats. In 1971 this information led to U.S. President Richard M. Nixon banning the use of the substance. Later research showed that Agent Orange contained high levels of teratogenic dioxins.</p> <p>A herbicide blend used by the British military during the Malayan Emergency and the U.S. military during the Vietnam War between January 1965 and April 1970 as a defoliant. It was a 50/50 mixture of the n-butyl esters of 2,4,5-T and 2,4-D. Because of TCDD contamination in the 2,4,5-T component, it has been blamed for serious illnesses in many people who were exposed to it. Part of the "Rainbow Herbicides" used during the Vietnam War, others were, Agent Pink, Agent Green, Agent Purple, Agent Blue, and Agent White. Agent Orange was manufactured for the U.S. Department of Defense primarily by Monsanto Corporation and Dow Chemical. Between 1961 and 1967, the U.S. Air Force sprayed 20,000,000 U.S. gallons of concentrated herbicides over 6 million acres of crops and trees, affecting an estimated 13% of South Vietnam's land. In 1965, 42% of all herbicide was sprayed over food crops. Not only was the vegetation affected, but also the wildlife: "a mid-1980s study by Vietnamese ecologists documented just 24 species of birds and 5 species of mammals present in sprayed forests and converted areas, compared to 145-170 bird species and 30-55 kinds of mammals in intact forest."</p> <p>In 1965, members of the U.S. Congress were told "crop destruction is understood to be the more important purpose ... but the emphasis is usually given to the jungle defoliation in public mention of the program." Military personnel were told they were destroying crops because they were going to be used to feed guerrillas. They later discovered nearly all of the food they had been destroying was not being produced for guerrillas; it was, in reality, only being grown to support the local civilian population. For example, in Quang Ngai province, 85% of the crop lands were scheduled to be destroyed in 1970 alone. This contributed to widespread famine, leaving hundreds of thousands of people malnourished or starving. Military film footage of U.S. troops spraying Agent Orange from a riverboat in Vietnam. U.S. Air Force records show at least 6,542 spraying missions took place over the course of Operation Ranch Hand. By 1971, 12 percent of the total area of South Vietnam had been sprayed with defoliating chemicals, at an average concentration of 13 times the recommended U.S. Department of Agriculture application rate for domestic use. In South Vietnam alone, an estimated 10 million hectares of agricultural land was ultimately destroyed. In some areas, TCD Dconcentrations in soil and water were hundreds of times greater than the levels considered safe by the U.S. Environmental Protection Agency. The campaign destroyed 5 million acres (20,000 km2) of upland and mangrove forests and millions of acres The U.S. military began targeting food crops in October 1962, primarily using Agent Blue; the American public was not made aware of the crop destruction programs until 1965 (and it was then believed that crop spraying had begun that spring). In 1965, 42 percent of all herbicide spraying was dedicated to food crops. The first official acknowledgement of the programs came from the State Department in March 1966.</p> <p>Vietnamese victims affected by Agent Orange attempted a class action lawsuit against Dow Chemical and other US chemical manufacturers, but District Court Judge Jack B. Weinstein dismissed their case. They appealed, but the dismissal was cemented in February 2008 by the Court of Appeals for the Second Circuit. As of 2006, the Vietnamese government estimates that there are over 4,000,000 victims of dioxin poisoning in Vietnam, although the United States government denies any conclusive scientific links between Agent Orange and the Vietnamese victims of dioxin poisoning. In some areas of southern Vietnam, dioxin levels remain at over 100 times the accepted international standard. The U.S. Veterans Administration has listed prostate cancer, respiratory cancers, multiple myeloma, Diabetes mellitus type 2, B-cell lymphomas, soft-tissue sarcoma, chloracne, porphyria cutanea tarda, peripheral neuropathy, and spina bifida in children of veterans exposed to Agent Orange. On the 9th of August 2012, the United States and Vietnam began a cooperative cleaning up of the toxic chemical on part of Danang International Airport, marking the first time Washington has been involved in cleaning up Agent Orange in Vietnam.</p>
Warfarin	<p>Warfarin first came into commercial use in 1948 as a rat poison. In 1954 it was approved for medical use in the United States. Coumarins (4-hydroxycoumarin derivatives) are used as rodenticides for controlling rats and mice in residential, industrial, and agricultural areas. Warfarin is both odorless and</p>

	<p>tasteless, and is effective when mixed with food bait, because the rodents will return to the bait and continue to feed over a period of days until a lethal dose is accumulated (considered to be 1 mg/kg/day over about six days). It may also be mixed with talc and used as a tracking powder, which accumulates on the animal's skin and fur, and is subsequently consumed during grooming. The LD50 is 50–500 mg/kg. The IDLH value is 100 mg/m3 (warfarin; various species).</p> <p>The use of warfarin itself as a rat poison is now declining, because many rat populations have developed resistance to it, and poisons of considerably greater potency are now available. Other 4-hydroxycoumarins used as rodenticides include coumatetralyl and brodifacoum, which is sometimes referred to as "super-warfarin", because it is more potent, longer-acting, and effective even in rat and mouse populations that are resistant to warfarin. Unlike warfarin, which is readily excreted, newer anticoagulant poisons also accumulate in the liver and kidneys after ingestion. However, such rodenticides may also accumulate in birds of prey and other animals that eat the poisoned rodents or baits.</p> <p>Warfarin is used to cull vampire bat populations in areas where human–wildlife conflict is a concern. Vampire bats are captured with mist nets and coated with a combination of petroleum jelly and warfarin. The bat returns to its roost and other members of the roost become poisoned as well by ingesting the warfarin after reciprocal grooming. Suspected vampire bat roosts may also be coated in the warfarin solution, though this kills other bat species and remains in the environment for years. The efficacy of killing vampire bats to reduce rabies transmission is questionable, however; a study in Peru showed that culling programs did not lead to lower transmission rates of rabies to livestock and humans.</p>
Petroleum	<p>Diesel, and other heavy oil derivatives, are known to be informally used at times, but are usually banned for this purpose. Many individuals use gasoline and used oil to kill weeds by pouring it directly onto the unwanted flora, this not only kills the flora but also contaminates the soil.</p>
Daminozide	<p>Daminozide — also known as Alar, Kylar, B-NINE, DMSA, SADH, or B 995 — is a plant growth regulator, a chemical sprayed on fruit to regulate their growth, make their harvest easier, and keep apples from falling off the trees before they are ripe. This makes sure they are red and firm for storage. Alar was first approved for use in the U.S. in 1963, it was primarily used on apples until 1989 when it was voluntarily withdrawn by the manufacturer after the U.S. Environmental Protection Agency proposed banning it based on concerns about cancer risks to consumers.</p>
Avicides	<p>An avicide is any substance (normally, a chemical) which can be used to kill birds. Commonly used avicides include strychnine, DRC-1339 (3-chloro-4-methylaniline hydrochloride, Starlicide) and CPTH (3-chloro-p-toluidine, the free base of Starlicide), and Avitrol (4-aminopyridine). Chloralose is also used as an avicide. In the past, highly concentrated formulations of parathion in diesel oil were also used, applied by aircraft spraying over the nesting colonies of the birds. It is impossible to minimize risk from avicides for non-targets species.</p> <p>Starlicide is lethal to starlings with an acute oral LD50 of 3.8 milligrams per kilogram body weight, but it is less toxic to most other birds. Grain-eating game birds such as bobwhite quail, pheasants (<i>Phasianus colchicus</i>) and rooks (<i>Corvus frugilegus</i>) are also vulnerable. Hawks and mammals are resistant to the poison. Starlings are killed in a slow, "nonviolent" death by uremic poisoning and congestion of major organs. The effect is described as "a grayish white, frost-like material of uric acid overlaying the serosal surfaces of the various organs, accompanied by sterile inflammation and necrosis in the affected and adjacent tissues" akin to avian visceral gout. The site of action is believed to be in the kidney.</p> <p>Uses for CPTH include killing blackbirds on sprouting rice and on corn and soybean fields. For these and other uses the poison is often given with brown rice. Research continues to improve the effectiveness of delivery on brown rice by causing the poison to be retained on the bait longer and resist degradation by sunlight. The effect of the poison is believed to be cumulative: for example, the LC50 for starlings was 4.7 ppm over 30 days, but only 1.0 ppm when fed for 90 days.</p> <p>In 2009, a culling with starlicide received national attention after USDA employees dispensed the poison in Griggstown, New Jersey, to kill an estimated 5,000 starlings that plagued feed lots and dairies on local farms. When "it began raining birds", community members became alarmed, unsure whether a toxin or disease was at work. Two property owners in the area reported collecting more than 150 birds each from their land.</p> <p>In January 2011, there was another incident in Yankton, South Dakota, causing public alarm. The USDA had poisoned the birds in Nebraska to protect farmers' feeds.</p>

	<p>Starlicide can and does kill nontarget species of birds that eat at feedlots and other places it is used. However, this rarely occurs because of the places that Starlicide is used. Rusty blackbirds (<i>Euphagus carolinus</i>), once an abundant species that is declining precipitously, have been theorized to be declining as a result of the use of Starlicide. However, this issue has been analyzed and found to be non-significant and not discussed by Avery (2013). Rusty blackbirds primarily feed on invertebrates in wet woodlands and near streams throughout the year. Even though they roost with other blackbirds, Rusty Blackbirds usually will not feed with them. It should be noted that rusty blackbirds are a species not likely to be taken protecting crops because they mostly feed in wet woodland bottoms on acorns, pine seeds, fruits, and animal matter during winter, but sometimes will be found in feedlots (Avery 2013). Even at the highest potential nontarget take with Starlicide, few, if any, would be taken and not a cause a decline in their population. Habitat issues, possibly on their Canadian breeding habitat and on wintering grounds in the southeastern United States such as the decline of wetlands, is likely the primary reason for their decline.</p>
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SOURCE: Wikipedia (with some corrections, additions, and other edits)



SOURCE: National Museum of the U.S. Air Force - This image taken in the 1960s shows 4 U.S. Air Force C-123s spraying herbicides in Vietnam during operation Ranch Hand, part of the herbicidal warfare program during the Vietnam War called 'Operation Trail Dust', around 20% of the forests of South Vietnam were sprayed at least once with an herbicide, mostly Agent Orange.

In response to the 2016 Florida Zika outbreak, Miami-Dade County officials began to use naled, a highly toxic pesticide which has been banned in the European Union. Repeated exposure in humans can cause adult health issues as well as issues with neurodevelopment, growth, and respiratory health in children. It is highly toxic to bees, birds, butterflies, other insects, and aquatic life. It was recently linked to the precipitous decline of the butterfly in South Florida. (153) The U.S. Environmental Protection Agency states,

"Naled is currently being applied by aerial spraying to about 16 million acres within the mainland United States as part of routine mosquito control, but it can also be used following natural disasters such as hurricanes and floods: In 2004, it was used extensively to treat eight million acres across Florida as part of the emergency responses to hurricanes. In 2005 after Hurricane Katrina, five million acres of Louisiana, Mississippi, and Texas were treated with naled to kill mosquitoes. Naled has been used in highly populated major metropolitan areas as well as other areas. Historically, naled has been used in Puerto Rico in attempts to control dengue. In 1987, the CDC carried out aerial spraying of naled across 177,000 acres of metropolitan San Juan." (152)

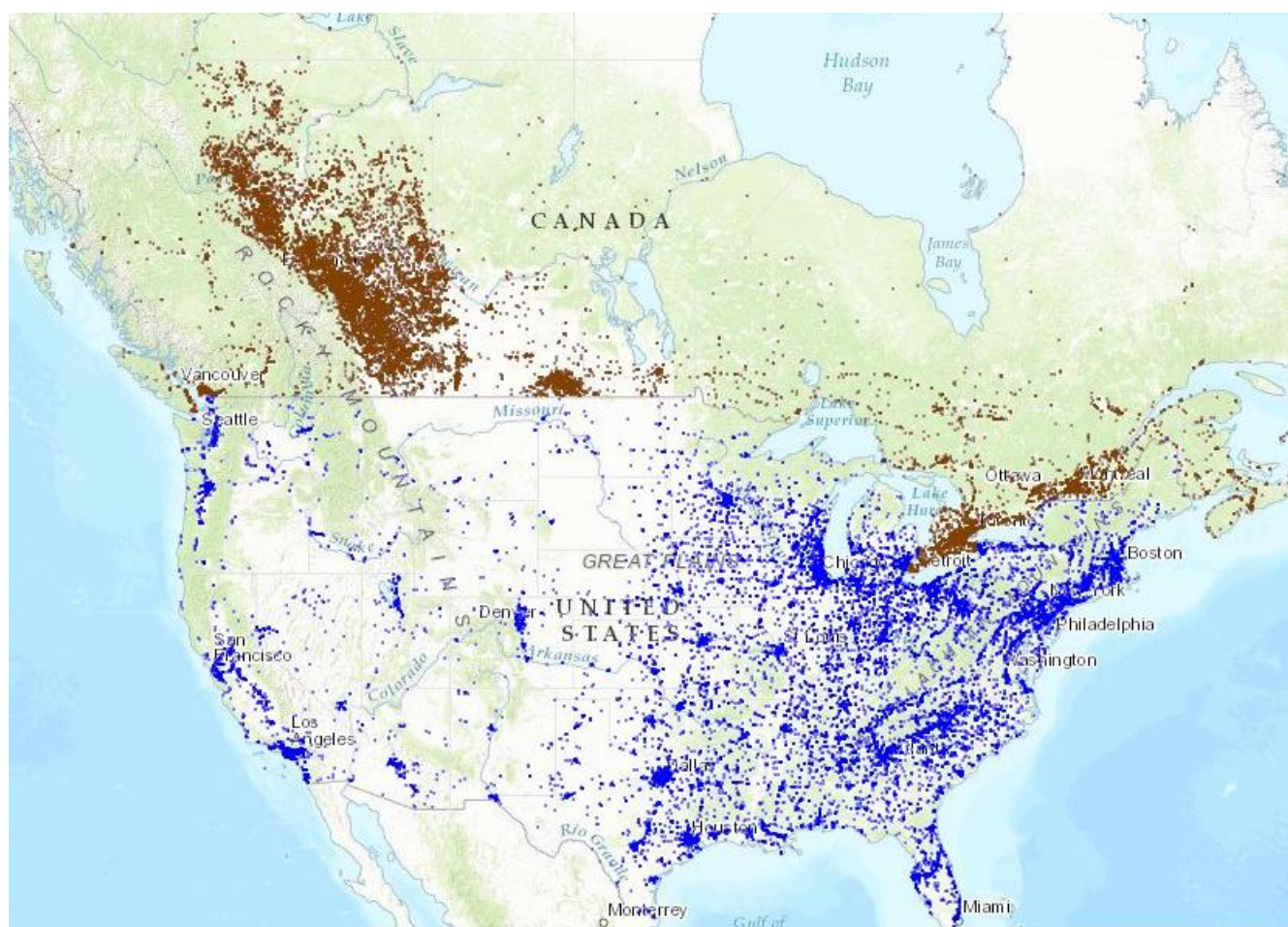
If the Florida bonneted bat *Eumops floridanus* was not near extinction, would the initial rapid spreading of the Zika virus have been slower and the invasion possibly even contained? If toxic pesticides and other anthropogenic activities had not decimated native dragonflies, damselflies, robberflies, bats, arachnids, frogs, and other natural predators of the mosquito, would this Zika outbreak have ever even occurred?

Atmospheric Pollution

Inversion increases atmospheric pollution in Delhi, Los Angeles, Lahore, Beijing, Mexico City, Tehran, and other cities. The air quality in many cities around the world is so bad that some citizens are forced to wear a mask. The World Health Organization (WHO) reported, that in 2012 an estimated 3,700,000 *Homo sapiens* died worldwide as a result of urban and rural air pollutions sources in addition to 4,300,000 *Homo sapiens* who died as a result of exposure when cooking indoors with coal, wood, and biomass stoves. (260) Excessive air pollution, mainly nitrogen dioxide, is often the by-product of poor or even non-existent regulations for transport, energy, waste management, and industry.

The 1997, 2005, 2006, 2009, 2013, and 2015 Southeast Asian hazes were all a result of slash-and-burn activities in the nearby rainforests of Indonesia. Stubble burning of wheat and other grain harvest areas which causes loss of soil nutrients, creates atmospheric pollution, and kills native florae and faunae, is still fairly common in the United States, France, India, and China. And every year, from December to April, anthropogenic pollution from automobiles, factories, and coal power plants creates a brown haze which engulfs the North Indian Ocean, South Asia, and Southeast Asia. This Indo-Asian haze aka Atmospheric Brown Cloud or Asian Brown Cloud, has been occurring for more than 25 years and has killed millions of *Homo sapiens* while also leaving millions more with permanent respiratory or other health issues. Since the early coal burning days in 1750, a similar event called Arctic Haze has been observed in the Arctic where pollution gets trapped during the winter months. (254) The Asian Dust storms which are a natural occurrence and have been for thousands of years, are now not only increasing in longevity and frequency, but have also become toxic from industrial pollutants like: sulfur, carbon monoxide, mercury, cadmium, chromium, arsenic, lead, zinc, copper, asbestos, and microscopic plastic. Although the film was censored by the Chinese government a few days after being released and viewed by more than 100,000,000 million Chinese, Chai Jing's 2015 documentary '*Under the Dome*', for the first time, showed the severity of the air pollution in China. Fortunately, the power and freedom of the Internet have again allowed the truth to overcome censorship and ultimately prevail, as the film is still available on YouTube and through other social media sites.

Each day, thousands of businesses around the world, from restaurants to factories, release a variety of toxic fumes into the atmosphere from their activities. Anytime chemicals are used, manufactured, or disposed of through incineration they can pollute the atmosphere. These chemicals, when released into the atmosphere, then have the potential to contaminate the soil and water through rain exposure. How many millions of air fresheners and other sprays are used every day toxifying the atmosphere with unnatural chemicals in an attempt to mask other odors, many of which are natural and could be simply eliminated by cleaning?



SOURCE: National Library of Medicine / TOXMAP - Total United States Toxics Release Inventory (TRI) between 1998 and 2015 as well as the Canadian National Pollutant Release Inventory (NPRI) between 1994 and 2013. - <https://toxmap.nlm.nih.gov/toxmap/>

Some cities around the world burn garbage which is collected from the inhabitants of the city. This plastic and other synthetically based debris is released into the atmosphere in the form of a toxic smoke and into the soils and water as a toxic ash. In addition, millions of individuals around the world dispose of their personal rubbish in this manner also. As a combined result of firewood burning, vehicle emissions, crop residue burning in agricultural fields, and factory emissions, India has the worst air quality in the world. A recent WHO report found that of the top 50 cities with the worst air quality 22 of them were in India. (258) This atmospheric pollution has also resulted in events like the Great smog of Delhi in 2016, which had a major impact on all areas of the city and led to a shutdown of schools, businesses, government services, and forced many residents to stay home for days. On November 8, 2017 at 4pm, the United States Embassy in New Delhi reported the AQI reached 1,110. By comparison on the same day the maximum AQI reached in Los Angeles was 82, New York 63, Mexico City 164, Shanghai 221, London 82, Sydney 30, Hong Kong 156, and Tokyo 191. (592) A recent analysis by WHO found that between 2008 and 2013 global urban air pollution levels increased by 8%, with far more low- and middle-income countries having toxic air. The WHO report stated,

"More than 80% of people living in urban areas that monitor air pollution are exposed to air quality levels that exceed WHO limits. While all regions of the world are affected, populations in low-income cities are the most impacted.

According to the latest urban air quality database, 98% of cities in low- and middle income countries with more than 100 000 inhabitants do not meet WHO air quality guidelines. However, in high-income countries, that percentage decreases to 56%." (259)

Scientists speculate that the excessive amount of Carbon Dioxide caused by *Homo sapiens* could remain in the atmosphere for 50 to 400 years. Some chemicals and the by-products which have been produced, like carbon

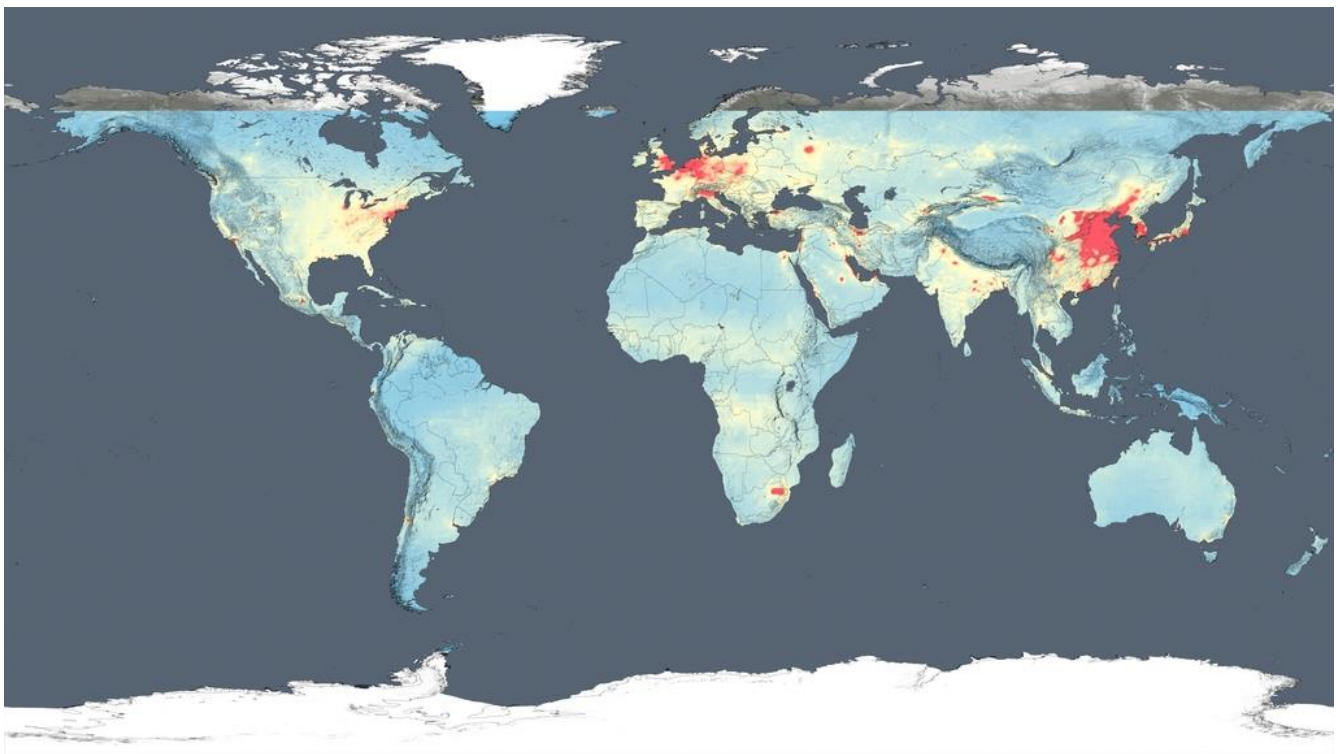
tetrafluoride, are expected to remain in the atmosphere for an estimated 50,000 years. Nitrogen dioxide emissions have since decreased dramatically between 2005 and 2014, as new regulations have been implemented in many countries, but too much is still emitted. In December 2015, Steve Cole and Ellen Gray of NASA reported that,

"These changes in air quality patterns aren't random," said Bryan Duncan, an atmospheric scientist at NASA's Goddard Space Flight Center in Greenbelt, Maryland, who led the research. "When governments step in and say we're going to build something here or we're going to regulate this pollutant, you see the impact in the data."

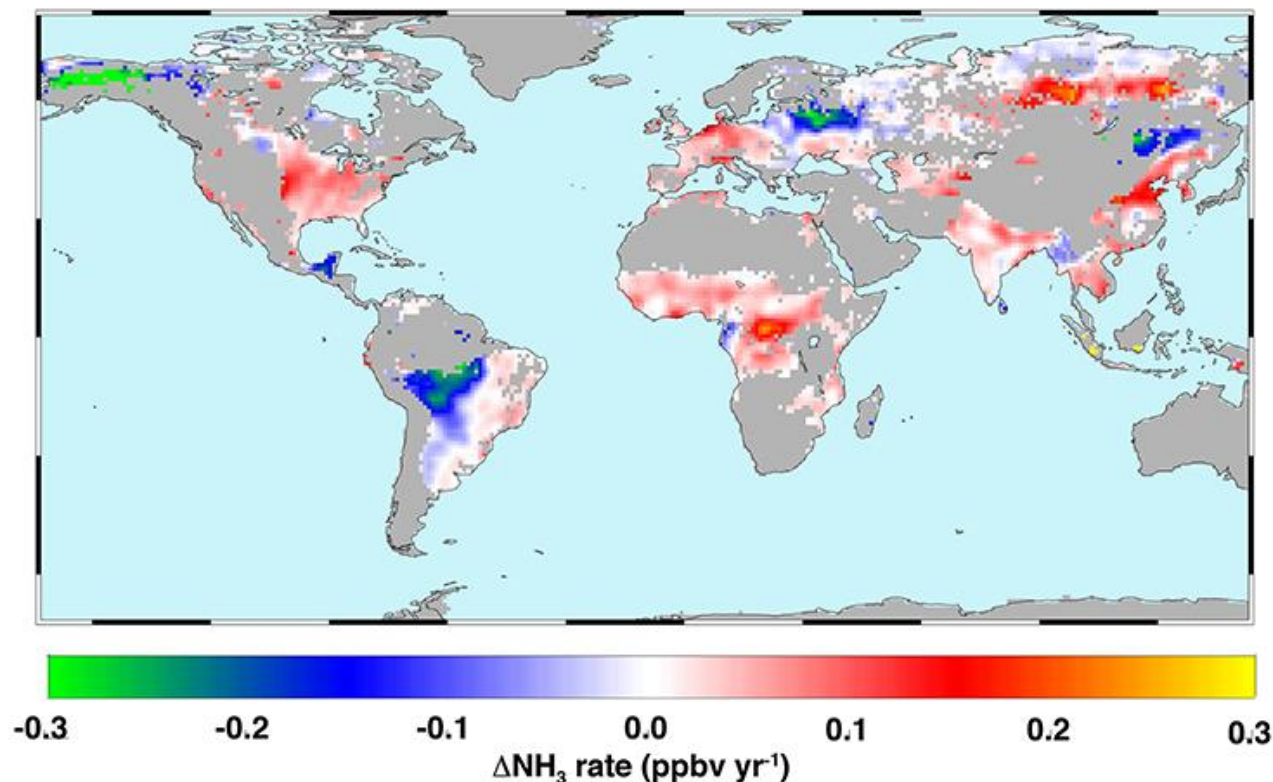
"The United States and Europe are among the largest emitters of nitrogen dioxide. Both regions also showed the most dramatic reductions between 2005 and 2014. Nitrogen dioxide has decreased from 20 to 50 percent in the United States, and by as much as 50 percent in Western Europe. Researchers concluded that the reductions are largely due to the effects of environmental regulations that require technological improvements to reduce pollution emissions from cars and power plants.

China, the world's growing manufacturing hub, saw an increase of 20 to 50 percent in nitrogen dioxide, much of it occurring over the North China Plain. Three major Chinese metropolitan areas -- Beijing, Shanghai, and the Pearl River Delta -- saw nitrogen dioxide reductions of as much as 40 percent."

"In the Middle East, increased nitrogen dioxide levels since 2005 in Iraq, Kuwait and Iran likely correspond to economic growth in those countries. However, in Syria, nitrogen dioxide levels decreased since 2011, most likely because of the civil war, which has interrupted economic activity and displaced millions of people." (84)



SOURCE: NASA - This global map shows the concentration of nitrogen dioxide in the atmosphere as detected by the Ozone Monitoring Instrument aboard the Aura satellite, averaged over 2014. - <https://svs.gsfc.nasa.gov/12094>

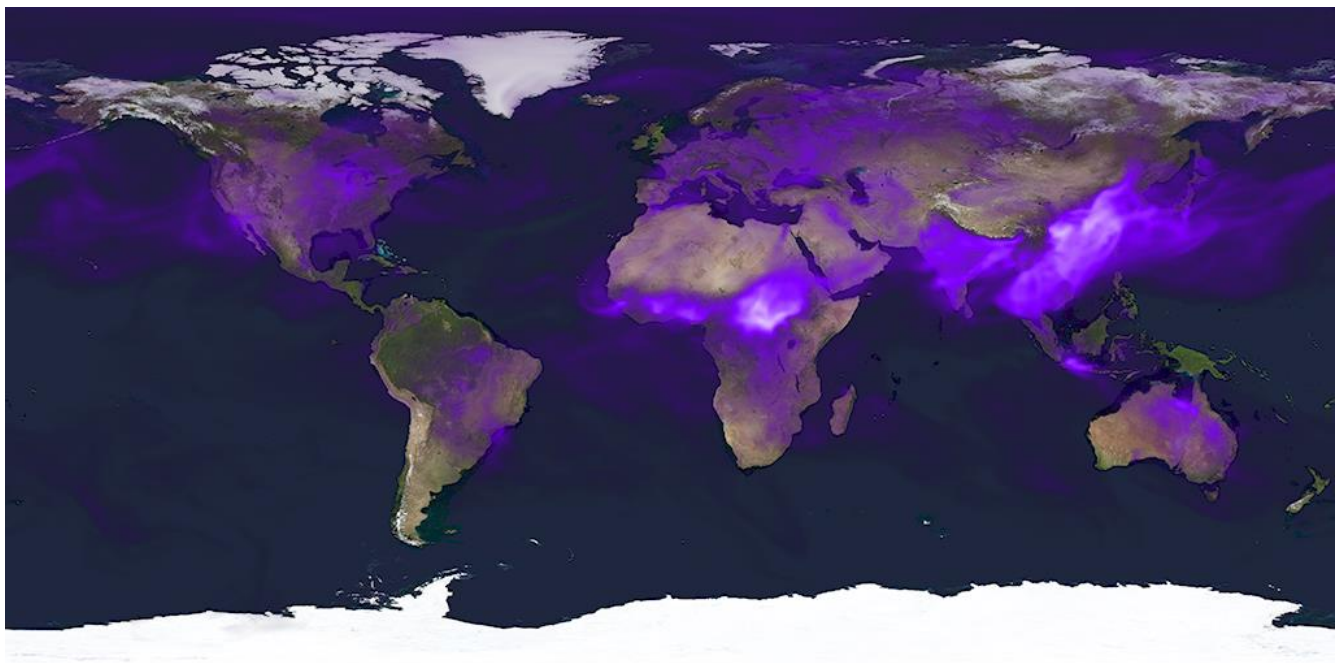


SOURCE: NASA - Global ammonia concentrations in the atmosphere have steadily increased over the last 15 years, mainly from widespread use of fertilizers for agriculture and vast amounts of animal waste produced from livestock. Global atmospheric ammonia trends measured from space from 2002 to 2016. Hot colors represent increases from a combination of increased fertilizer application, reduced scavenging by acid aerosols and climate warming. Cool colors show decreases due to reduced agricultural burning or fewer wildfires. Credit: Juying Warner/GRL. <https://climate.nasa.gov/news/2565/nasa-satellite-identifies-global-ammonia-hotspots/>

Some Major Air Pollutants	
Air Pollutant	Description
Carbon dioxide (CO ₂)	The current episode of global warming is attributed primarily to increasing industrial CO ₂ emissions into Earth's atmosphere. The global annual mean concentration of CO ₂ in the atmosphere has increased markedly since the Industrial Revolution, from 280 ppm to 409 ppm as of 2017. The present concentration is the highest in the past 800,000 years and likely the highest in the past 20 million years. The increase has been caused by anthropogenic sources, particularly the burning of fossil fuels and deforestation.
Sulfur dioxide (SO ₂)	Produced as a by-product of the burning of coal and petroleum. It is a major factor in causing Acid Rain.
Ammonia (NH ₃)	Ammonia (NH ₃) - emitted from agricultural processes. Ammonia is a compound with the formula NH ₃ . It is normally encountered as a gas with a characteristic pungent odor. Ammonia contributes significantly to the nutritional needs of terrestrial organisms by serving as a precursor to foodstuffs and fertilizers. Ammonia, either directly or indirectly, is also a building block for the synthesis of many pharmaceuticals. Although in wide use, ammonia is both caustic and hazardous. In the atmosphere, ammonia reacts with oxides of nitrogen and sulfur to form secondary particles.
chlorofluorocarbons (CFCs) and hydrochlorofluorocarbon (HCFCs)	These toxic chemicals are a potent greenhouse gas most famous for the depletion the ozone layer which allows harmful ultraviolet rays to reach the earth's surface. This can lead to skin cancer, disease to eye and can even cause damage to plants. Used in a wide range of applications like pharmaceuticals, agrichemicals, fluoropolymers, refrigerants, surfactants, anesthetics, oil-repellents, catalysis, and water-repellents. Banned by many countries but still used in some areas of the world in limited quantities. CFCs have largely been replaced by Hydrofluorocarbons (HFCs) which do not harm the ozone layer as much; however, they do contribute to global warming. Their atmospheric concentrations and contribution to anthropogenic greenhouse gas emissions are rapidly increasing, causing international concern about their radiative forcing.
Sulfur fluorides	Sulfur hexafluoride an extremely potent greenhouse gas with an estimated atmospheric lifetime of 800–3200

	years. It is mainly used in the electrical industry for semiconductor manufacturing. It was also used to fill Nike Air bags in all of their shoes from 1992-2006. How many millions of these shoes were made and how much of this gas used to make a gimmick for a consumer product? It is used as a filler gas in tennis balls, is there not another substance that could be used? How many millions of tennis balls are made every year?
Carbon Monoxide	Carbon monoxide is present in small amounts in the atmosphere, chiefly as a product of volcanic activity but also from natural and man-made fires (such as forest and bushfires, burning of crop residues, and sugarcane fire-cleaning). The burning of fossil fuels also contributes to carbon monoxide production. Carbon monoxide is a short-lived greenhouse gas and also has an indirect radiative forcing effect by elevating concentrations of methane and tropospheric ozone through chemical reactions with other atmospheric constituents (e.g., the hydroxyl radical, OH.) that would otherwise destroy them. Through natural processes in the atmosphere, it is eventually oxidized to carbon dioxide. Carbon monoxide is both short-lived in the atmosphere (on average about two months) and spatially variable in concentration. Carbon monoxide is a temporary atmospheric pollutant in some urban areas, chiefly from the exhaust of internal combustion engines (including vehicles, portable and back-up generators, lawn mowers, power washers, etc.), but also from incomplete combustion of various other fuels (including wood, coal, charcoal, oil, paraffin, propane, natural gas, and trash). Large CO pollution events can be observed from space over cities.
Sulfur hexafluoride	Sulfur hexafluoride (SF ₆) is an inorganic, colorless, odorless, non-flammable, extremely potent greenhouse gas, which is an excellent electrical insulator. More than 10,000 tons of SF ₆ are produced per year, most of which (over 8,000 tons) is used as a gaseous dielectric medium in the electrical industry. Other main uses include an inert gas for the casting of magnesium, and as an inert filling for insulated glazing windows. Was used to fill Nike Air bags in all of their shoes from 1992-2006. According to the Intergovernmental Panel on Climate Change, SF ₆ is the most potent greenhouse gas that it has evaluated, with a global warming potential of 23,900 times that of CO ₂ when compared over a 100-year period. Measurements of SF ₆ show that its global average mixing ratio has increased by about 0.2 ppt (parts per trillion) per year to over 7 ppt. Sulfur hexafluoride is also extremely long-lived, is inert in the troposphere and stratosphere and has an estimated atmospheric lifetime of 800–3200 years. Average global SF ₆ concentrations increased by about seven percent per year during the 1980s and 1990s, mostly as the result of its use in the magnesium production industry, and by electrical utilities and electronics manufacturers.
Tetrafluoromethane	Tetrafluoromethane is sometimes used as a low temperature refrigerant. It is used in electronics microfabrication alone or in combination with oxygen as a plasma etchant for silicon, silicon dioxide, and silicon nitride. Main industrial emissions of tetrafluoromethane besides hexafluoroethane are produced during production of aluminum using Hall-Héroult process. It is very stable, has an atmospheric lifetime of 50,000 years.
Methane	Produced as a by-product from the livestock industry and from landfills. Also known as natural gas, it is extracted from the Earth and used as an energy source. Emitting less carbon dioxide, sulfur dioxide, and nitrous oxide than coal and oil when burned as an energy source, it is marketed as a clean energy source. But it is far from clean being a potent greenhouse gas which traps heat more efficiently in the atmosphere. Much of the natural gas is lost due during the extraction process and during the transfer to customers due to leaks. It is a major cause of global warming. The Earth's atmospheric methane concentration has increased by about 150% since 1750, and it accounts for 20% of the total radiative forcing from all of the long-lived and globally mixed greenhouse gases.
Nitrous Oxide	It is used in surgery and dentistry for its anesthetic and analgesic effects. It is known as “laughing gas” due to the euphoric effects of inhaling it, a property that has led to its recreational use as a dissociative anesthetic. It is also used as an oxidizer in rockets and in motor racing to increase the power output of engines. It is a greenhouse gas with a large global warming potential (GWP). When compared to carbon dioxide (CO ₂), N ₂ O has 298 times the ability per molecule of gas to trap heat in the atmosphere. According to 2006 data from the United States Environmental Protection Agency, industrial sources make up only about 20% of all anthropogenic sources, and include the production of nylon, and the burning of fossil fuel in internal combustion engines. Human activity is thought to account for 30%; tropical soils and oceanic release account for 70%. However, a 2008 study by Nobel Laureate Paul Crutzen suggests that the amount of nitrous oxide release attributable to agricultural nitrate fertilizers has been seriously underestimated, most of which would presumably come under soil and oceanic release in the Environmental Protection Agency data. Atmospheric levels have risen by more than 15% since 1750. Nitrous oxide also causes ozone depletion. A new study suggests that N ₂ O emission currently is the single most important ozone-depleting substance (ODS) emission and is expected to remain the largest throughout the 21st century.
Perfluorocarbons	Produced mainly as a by-product of the aluminum smelting industry. Also used in many diverse applications like cosmetics. Very potent greenhouse gas with a long atmospheric lifetime.
Volatile organic compounds	Volatile organic compounds (VOCs) are organic chemicals that have a high vapor pressure at ordinary room temperature. Their high vapor pressure results from a low boiling point, which causes large numbers of molecules to evaporate or sublime from the liquid or solid form of the compound and enter the surrounding

	<p>air, a trait known as volatility. VOCs are numerous, varied, and ubiquitous. They include both human-made and naturally occurring chemical compounds. Most scents or odors are of VOCs. VOCs play an important role in communication between plants, and messages from plants to animals. Some VOCs are dangerous to human health or cause harm to the environment. Anthropogenic VOCs are regulated by law, especially indoors, where concentrations are the highest. Harmful VOCs typically are not acutely toxic, but have compounding long-term health effects. Because the concentrations are usually low and the symptoms slow to develop, research into VOCs and their effects is difficult.</p> <p>A major source of man-made VOCs are coatings, especially paints and protective coatings. Solvents are required to spread a protective or decorative film. Approximately 12 billion litres of paints are produced annually. Typical solvents are aliphatic hydrocarbons, ethyl acetate, glycol ethers, and acetone. Motivated by cost, environmental concerns, and regulation, the paint and coating industries are increasingly shifting toward aqueous solvents. Methylene chloride can be found in adhesive removers and aerosol spray paints. In the human body, methylene chloride is metabolized to carbon monoxide. If a product that contains methylene chloride needs to be used the best way to protect human health is to use the product outdoors. In the United States, methylene chloride is listed as exempt from VOC status. Many building materials such as paints, adhesives, wall boards, and ceiling tiles slowly emit formaldehyde, which irritates the mucous membranes and can make a person irritated and uncomfortable. Relative humidity within an indoor environment can also affect the emissions of formaldehyde. High relative humidity and high temperatures allow more vaporization of formaldehyde from wood-materials.</p> <p>The ability of organic chemicals to cause health effects varies greatly from those that are highly toxic, to those with no known health effects. As with other pollutants, the extent and nature of the health effect will depend on many factors including level of exposure and length of time exposed. Eye and respiratory tract irritation, headaches, dizziness, visual disorders, and memory impairment are among the immediate symptoms that some people have experienced soon after exposure to some organics. At present, not much is known about what health effects occur from the levels of organics usually found in homes. Many organic compounds are known to cause cancer in animals; some are suspected of causing, or are known to cause, cancer in humans.</p>
Black Carbon	<p>An ash pollutant created as a by-product of burning fossil fuels, biofuels, and biomass. This sometimes toxic ash is thought to possibly cause a global cooling effect blocking sunlight from reaching the earth and thus temporarily offsetting or masking the effects of global warming. It can have a secondary environmental impact once it descends out of the atmosphere and lands on ice or snow surfaces absorbing sunlight and thus melting the ice or snow.</p>
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

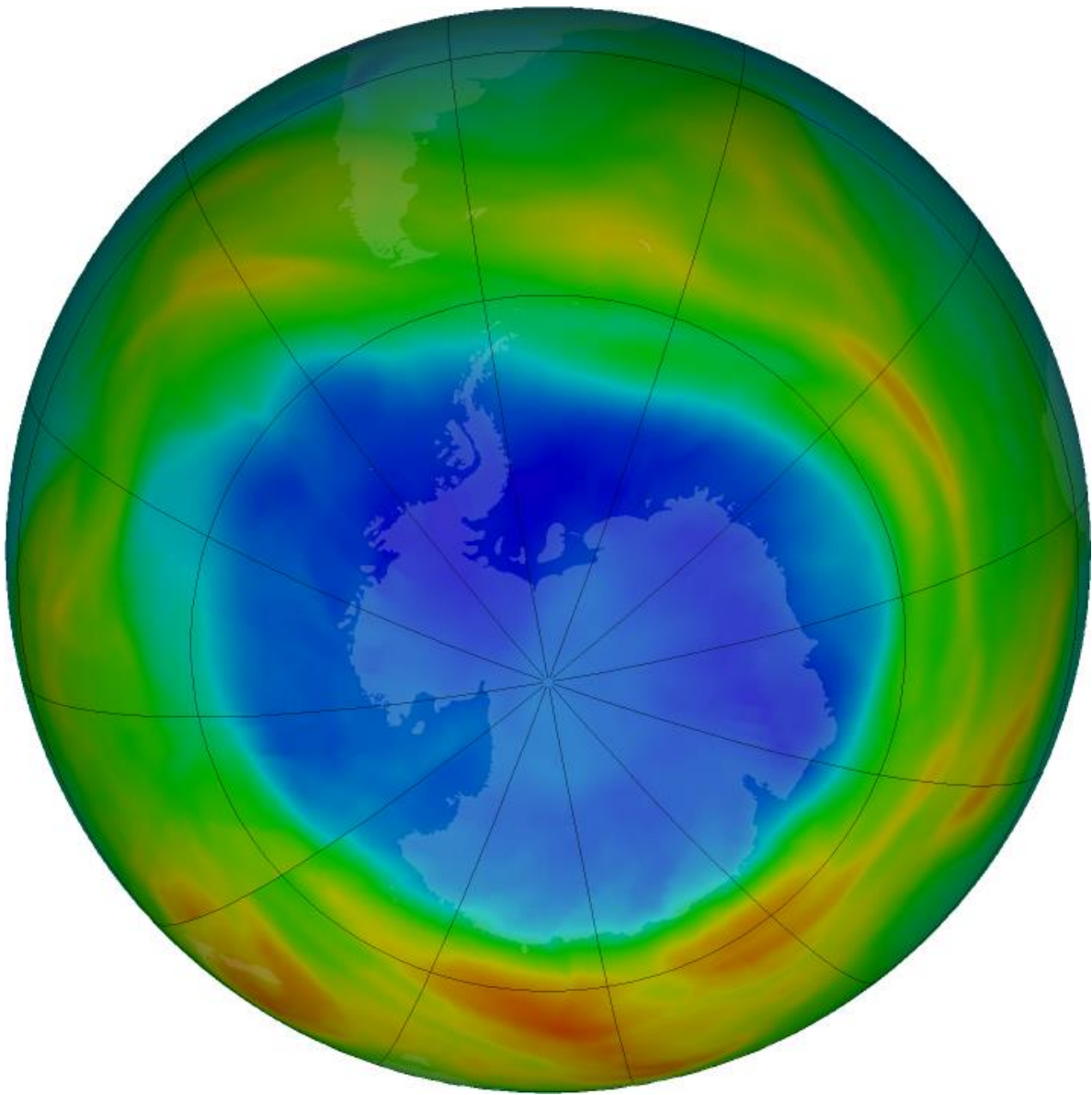


SOURCE: NASA - The global atmospheric black carbon density from August 1, 2009 through November 19, 2009, from the GOCART model.

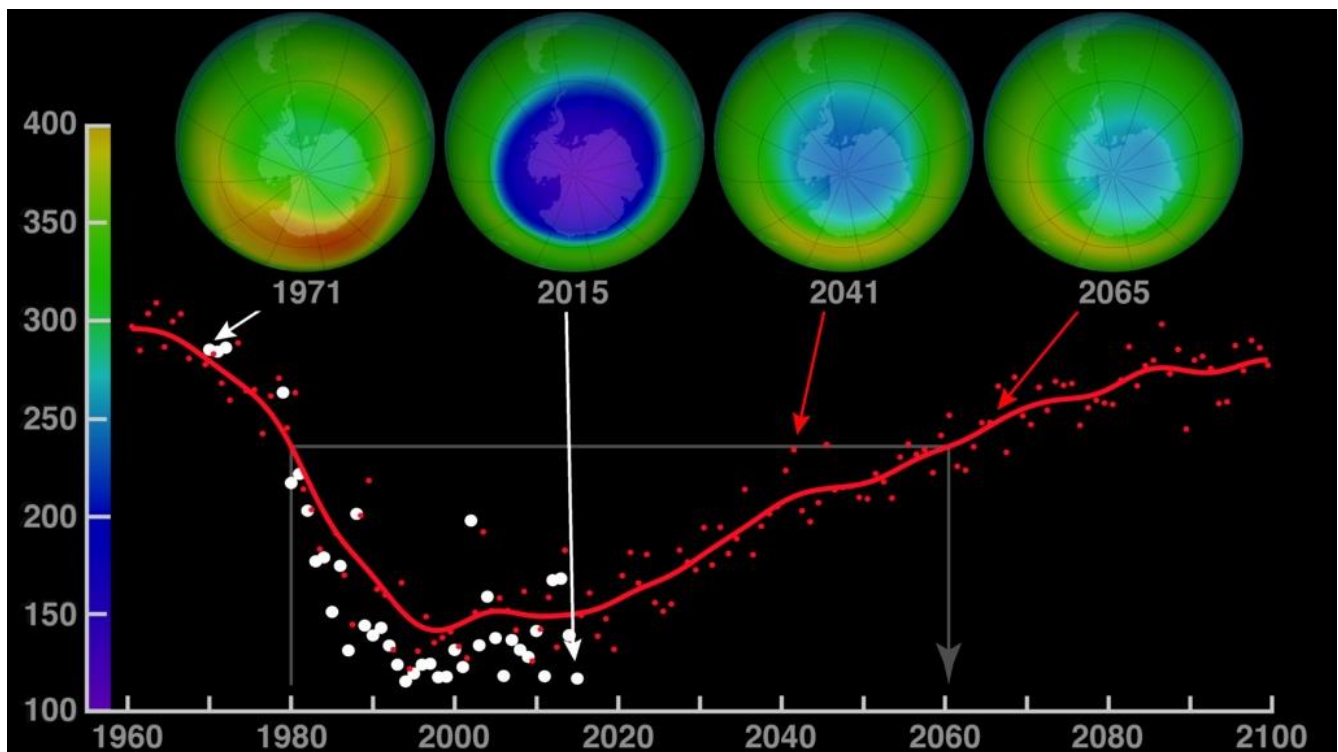
Ozone Hole

For more than 30 years, during springtime in Antarctica, the ozone layer in the stratosphere becomes depleted causing the phenomenon called the '*Ozone Hole*'. In the Arctic and northern and southern midlatitude regions, another depletion of the ozone layer has also been observed during the late winter and early spring period. While volcanoes and solar cycles can naturally alter the ozone layer of the Earth, these depletions were caused by anthropogenic releases of toxic chemicals into the atmosphere called ozone-depleting substances (ODSs) like chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform, and which were still being phased out by some nations in 2017. The Montreal Protocol helped to decrease and ultimately phase-out the production of (ODSs) and the ozone has shown signs of continued recovery, but the ozone will take many more years to fully recover. It should also be noted that a new study released in 2018 found that CFC levels have actually increased recently due to an unknown producer of CFCs. The study noted that,

“The Montreal Protocol was designed to protect the stratospheric ozone layer by enabling reductions in the abundance of ozone-depleting substances such as chlorofluorocarbons (CFCs) in the atmosphere. The reduction in the atmospheric concentration of trichlorofluoromethane (CFC-11) has made the second-largest contribution to the decline in the total atmospheric concentration of ozone-depleting chlorine since the 1990s. However, CFC-11 still contributes one-quarter of all chlorine reaching the stratosphere, and a timely recovery of the stratospheric ozone layer depends on a sustained decline in CFC-11 concentrations¹. Here we show that the rate of decline of atmospheric CFC-11 concentrations observed at remote measurement sites was constant from 2002 to 2012, and then slowed by about 50 per cent after 2012. The observed slowdown in the decline of CFC-11 concentration was concurrent with a 50 per cent increase in the mean concentration difference observed between the Northern and Southern Hemispheres, and also with the emergence of strong correlations at the Mauna Loa Observatory between concentrations of CFC-11 and other chemicals associated with anthropogenic emissions. A simple model analysis of our findings suggests an increase in CFC-11 emissions of 13 ± 5 gigagrams per year (25 ± 13 per cent) since 2012, despite reported production being close to zero⁴ since 2006. Our three-dimensional model simulations confirm the increase in CFC-11 emissions, but indicate that this increase may have been as much as 50 per cent smaller as a result of changes in stratospheric processes or dynamics. The increase in emission of CFC-11 appears unrelated to past production; this suggests unreported new production, which is inconsistent with the Montreal Protocol agreement to phase out global CFC production by 2010.” (156)



SOURCE: NASA – September 1, 2017 - False-color view of total ozone over the Antarctic pole. The purple and blue colors are where there is the least ozone, and the yellows and reds are where there is more ozone.
https://ozonewatch.gsfc.nasa.gov/Scripts/big_image.php?date=2017-09-01&hem=S



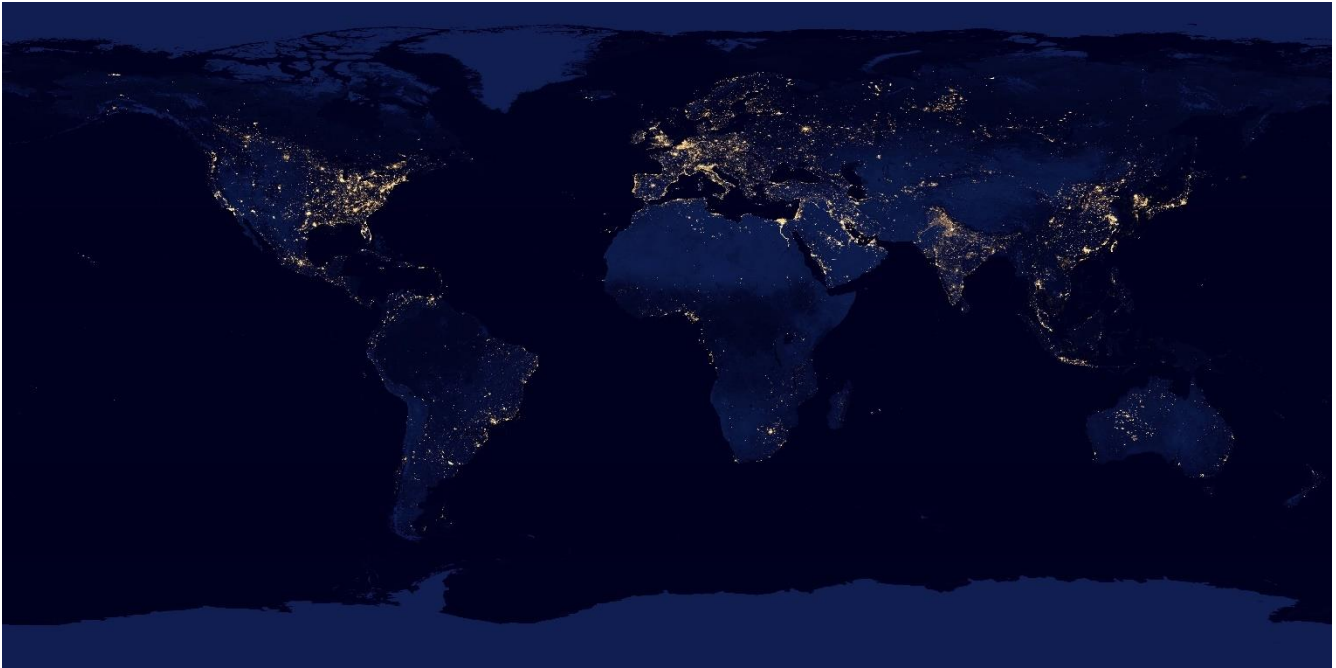
SOURCE: NASA - Ozone is Earth's natural sunscreen, shielding life from dangerous solar ultraviolet radiation. Human-produced chemicals in our atmosphere—such as chlorofluorocarbons (CFCs), used for many years as refrigerants and in aerosol spray cans—have depleted the Earth's ozone layer. Scientists first recognized the potential for harmful effects of CFCs on ozone in the early 1970s. In the 1980s, governments around the world woke up to the destruction of the ozone layer and in 1987 negotiated the Montreal Protocol—an international treaty designed to protect the ozone layer by banning CFCs and similar ozone-depleting chemicals. Since the mid-1990s, global ozone levels have become relatively stable. In fact, because of the Montreal Protocol, model simulations suggest the size of the hole should return to its pre-1980 levels by about 2075. Here, the four globes show monthly-averaged total ozone over Antarctica in October. The 1971 and 2006 globes were created with data from NASA's Nimbus-4 Backscatter Ultraviolet instrument and Aura's Ozone Monitoring Instrument, respectively. The 2041 and 2076 globes were made using output from the NASA Goddard Earth Observing System Chemistry-Climate Model, or GEOS-CCM. The graph shows each year's October average minimum (white dots) over Antarctica. The red curve represents a smoothed version of the white dots. <https://svs.gsfc.nasa.gov/30602>

Light and Sound Pollution

Two often-overlooked sources of atmospheric pollution are the artificial light generated by anthropogenic sources at night, and the noises created by anthropogenic activities. There is so much light pollution in fact, that there are millions of *Homo sapiens* throughout the world who have never even seen the stars with their naked eye, simply because they live in cities where the stars no longer shine. The 3rd brightest object in the night sky is not a star or planet, but rather the International Space Station. Vast amounts of energy are wasted each night when millions of pointless lights illuminate an area of Earth for no reason. How much less light pollution would there be if more lights had sensors to activate the light only when it's needed? The Earth has always had darkness, and nature has evolved with this darkness for billions of years. Artificial lights at night can potentially discombobulate nocturnal insects, birds, and other faunae which have evolved over millions of years in the dark. Light and dark are influential regulators of behavior for many species mediating migration, reproduction, courtship, and other things. There have also been negative impacts on flora reproductive systems from artificial lights. A 2017 study, found that nocturnal insect pollinators in artificially illuminated areas visited florae 62% less than areas which had natural darkness, which resulted in a 13% reduction of fruit production even though they also had visits by diurnal pollinators. (701) There have also been several biomedical studies which have linked a disruption of circadian rhythms by artificial light at night. (702)

Most city inhabitants are not awoken by the sounds of birds, but rather the sounds of traffic and other anthropogenic noises, and these excessive noises have also disrupted some fauna acoustic communications. The Lombard effect has been observed in several bird species in their attempts to overcome auditory masking created

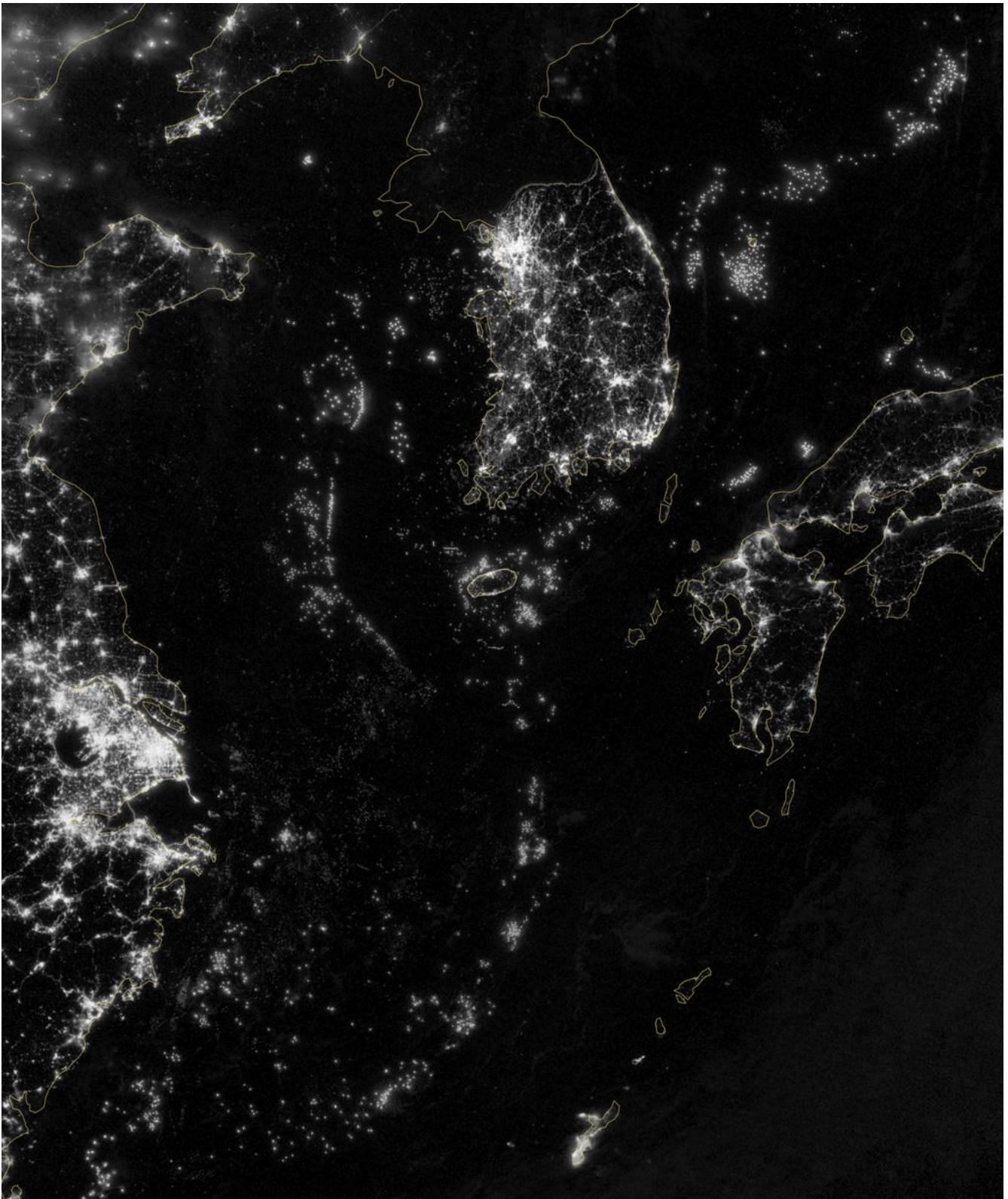
by anthropogenic noises. A 2004 study, found that anthropogenic noises were affecting the behavioral ecology of singing male free-ranging nightingales causing them to sing with higher sound levels at noisier locations. (703) A 2007 study, found that European robins, which are highly territorial and extremely dependent on vocal communication, compensated for anthropogenic noises by singing at night instead of during the day. (704) A 2016 study, found that 5 of 10 songbird species within the vicinity of a major European airport began singing earlier to compensate for noises created by the air traffic. The study also found that chaffinches avoided singing during airplane takeoffs when the noise exceeded a certain threshold. (705)



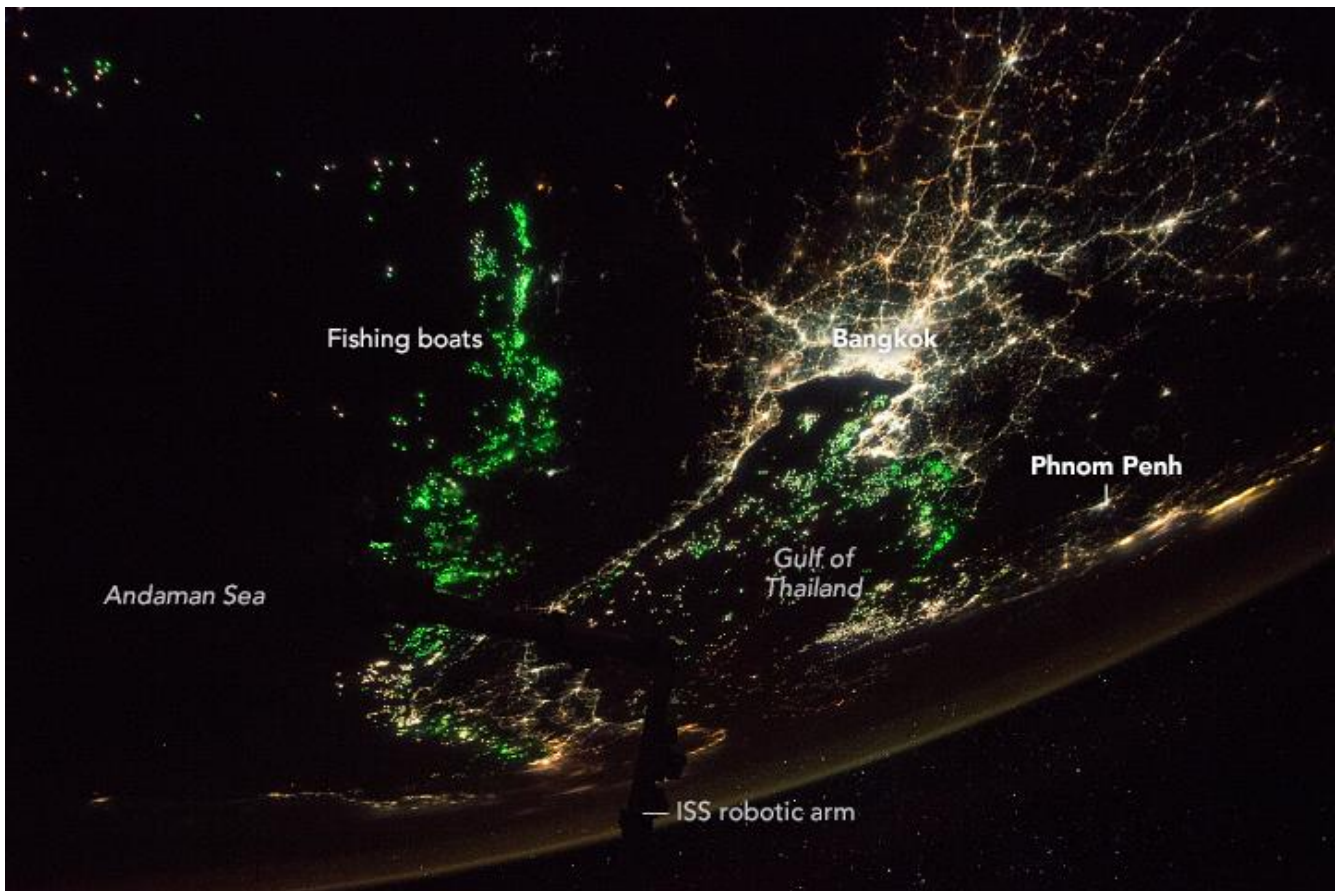
SOURCE: NASA Earth Observatory/NOAA NGDC - Composite map of the world assembled from data acquired by the Suomi NPP satellite in April and October 2012. https://www.nasa.gov/mission_pages/NPP/news/earth-at-night.html



SOURCE: NASA Earth Observatory/NOAA NGDC - his image of the continental United States at night is a composite assembled from data acquired by the Suomi NPP satellite in April and October 2012. https://www.nasa.gov/mission_pages/NPP/news/earth-at-night.html



SOURCE: NASA – Thousands of fishing boats at night in the Sea of Japan and Yellow Sea region, land areas are outlined in yellow.
<https://earthobservatory.nasa.gov/NaturalHazards/view.php?id=79796>



SOURCE: NASA - The adjacent waters of the Andaman Sea and Gulf of Thailand are illuminated by hundreds of green lights on fishing boats. Fishermen use the lights to attract plankton and fish, the preferred diet of commercially important squid. As the bait swims to the surface, the squid follow to feed and get caught by fishermen. The same fishing practices are used off the Atlantic coast of South America. Astronaut photograph ISS053-E-451778 was acquired on December 10, 2017, with a Nikon D5 digital camera using a 24 millimeter lens and is provided by the ISS Crew Earth Observations Facility and the Earth Science and Remote Sensing Unit, Johnson Space Center. The image was taken by a member of the Expedition 53 crew. - <https://earthobservatory.nasa.gov/IOTD/view.php?id=92152>



SOURCE: NASA – “Adorned with lights for night fishing, the boats cluster offshore along invisible lines: the underwater edge of the continental shelf, the nutrient-rich Malvinas Current, and the boundaries of the exclusive economic zones of Argentina and the Falkland Islands.

The night fishermen are hunting for *Illex argentinus*, a species of short-finned squid that forms the second largest squid fishery on the planet. The squid are found tens to hundreds of kilometers offshore from roughly Rio de Janeiro to Tierra del Fuego (22 to 54 degrees South latitude). They live 80 to 600 meters (250 to 2,000 feet) below the surface, feeding on shrimp, crabs, and fish. In turn, *Illex* are consumed by larger finfish, whales, seals, sea birds, penguins...and humans.

Working in these high chlorophyll areas, fishermen from South America and Southeastern Asia light up the ocean with powerful lamps that attract the plankton and fish species that the squid feed on. The squid follow their prey toward the surface, where they are easier for fishermen to catch with jigging lines. Squid boats can carry more than a hundred of these lamps, generating as much as 300 kilowatts of light per boat.

Officially, about 100 boats receive permits each year to work the squid fishery; satellite images suggest that many more are out there, though. The map below shows the locations of fishing boats on nine consecutive nights from April 17 to 25, 2012. (Lights appear sharper on some nights and more diffuse on others due to the presence or absence of cloud cover and fog.) In addition to the fishing boats, large refrigeration and refueling ships keep the long-distance operators working without having to go back to a port.

Fisheries researchers and managers suggest that as much as 300,000 tons of *Illex* squid are harvested from the South Atlantic each year by unlicensed, unregulated fishing vessels. Managing the fishery and monitoring the presence of foreign fishing fleets is very difficult for navies and fisheries managers; the satellite views provide at least some sense of the activity in the area.” <https://earthobservatory.nasa.gov/Features/Malvinas/>

Hazardous Waste and Superfund Sites

In 1973, the United States Congress was informed by the Environmental Protection Agency that 10,000,000 tons of nonradioactive hazardous waste were being produced in the United States each year, by 1984 the EPA estimate increased exponentially to 250,000,000 tons. (510) Since then, there have been dramatic reductions, but mismanagement is now done through injecting the hazardous waste deep into the Earth. A recent U.S.

Environmental Protection Agency Report on the Environment stated,

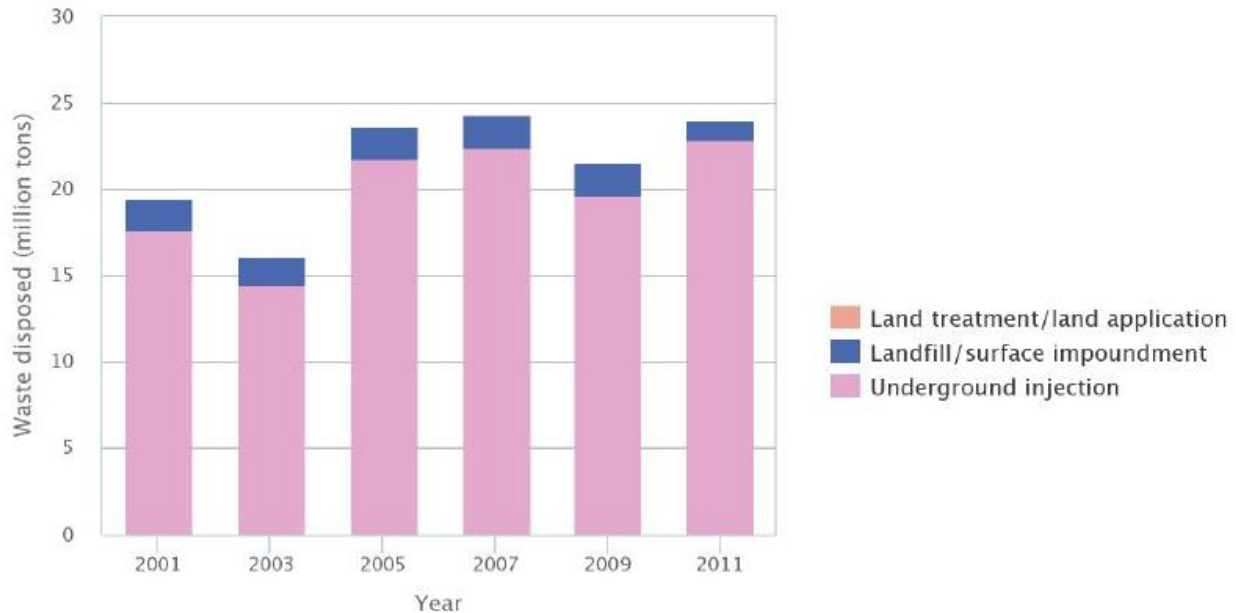
"Hazardous waste is solid waste with a chemical composition or other property that makes it capable of causing illness, death, or some other harm to humans, plants, animals, and ecosystems when mismanaged or released into the environment. Before the 1976 enactment of the Resource Conservation and Recovery Act (RCRA), uncontrolled dumping of wastes, including hazardous wastes, was commonplace, with numerous entities handling and disposing of these materials. Some of this hazardous waste was co-disposed with non-hazardous waste (e.g., municipal solid waste). Landfills and surface impoundments containing these materials were originally unlined and uncovered, resulting in contaminated ground water, surface water, air, and soil. Even with current tight control of hazardous wastes from generation to disposal, the potential exists for accidents that could result in the release of hazardous wastes and their hazardous constituents into the environment. Through RCRA and the subsequent 1984 Hazardous and Solid Waste Amendments, Congress sought to better control waste management and disposal in such a way that they do not cause harm to human health and the environment, and to conserve valuable materials and energy resources."

"Beyond the potential environmental impacts of hazardous waste disposal, patterns in hazardous waste generation reflect a component of the total materials a society creates and uses, which is an important aspect of sustainability. Generally speaking, as a society creates and consumes more materials, it demands more resources (e.g., water, energy, minerals, land) and generates greater quantities of pollutants and waste. In the U.S., more than 90 percent of the raw materials extracted from the environment, transported, and processed are eventually discharged as waste or atmospheric emissions."

"Over the course of six reporting cycles (2001-2011), the quantity of RCRA hazardous waste generated in the U.S. ranged from 20.3 to 28.8 million tons, or MT."

"From 2001 to 2011, the quantity of RCRA hazardous waste ultimately land-disposed ranged from 16.1 to 24.3 MT (Exhibit 2). During this time, deep well injection consistently accounted for 90 to 95 percent of all RCRA hazardous wastes disposed of on land." (511)

Exhibit 2. RCRA hazardous waste disposal to land in the U.S. by practice, 2001–2011



Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: U.S. EPA, 2013

Some things can be very toxic to organic life on Earth, be it synthetically created chemicals in a lab or natural things being forced from the depths of the Earth like oil or other minerals. If a substance being used to create something is so toxic that it will take years to biodegrade and there is no other way to dispose of it other than to inject it deep into the Earth, is it really the wisest choice of materials to use? How can companies be allowed to create such hazardous waste and pollute the depths of Earth? Is this toxic legacy just waiting to later resurface and pollute the Earth?

In 1980, after much controversy, the United States Federal Government started the Superfund program to clean-up hazardous substances, pollutants, or contaminants which have accumulated and made some areas throughout the United States toxic. Since 1980, the EPA has identified more than 47,000 hazardous waste sites which could potentially require cleanup. (492) The Superfund: National Priorities List (NPL) are sites which have been identified and deemed a national priority, and as of August 3, 2017, there were 1,343 NPL sites, 393 deleted NPL sites, and 49 proposed NPL sites. (491) Management and clean up was originally financed through taxes levied on the oil and chemical companies, as the sites were a result from their actions. In 1995, Congress let those taxes expire and the program is now funded by taxes collected from American taxpayers. Should not the oil and chemical companies be made to pay for the toxic consequences of their actions? Why has this huge debt fallen onto the American taxpayer? It has been 37 years since the Superfund program was started, and only 393 sites have been deleted, why is it taking so long to delete the remaining 1,343 NPL sites? What is the final analysis for the other 47,000 hazardous waste sites? How much hazardous waste is created worldwide each year? How much hazardous waste is created and improperly disposed of in a landfill or dumped directly onto the surface of the Earth? How many thousands of similar toxic sites exist globally?



SOURCE: National Library of Medicine / TOXMAP – Red dots indicate the locations of 1,343 Superfund sites listed on the National Priorities List (NPL) - August 03, 2017 - <https://toxmap.nlm.nih.gov/toxmap/>

In 2013, the Blacksmith Institute's annual report identified 3,200 toxic hotspots in 49 countries affecting an estimated 83,000,000 *Homo sapiens*. (364) Cancer clusters have been identified in communities around the world resulting from pollution of nearby mining, factories, power plants, oil refineries, or other industrial activities. The infamous 'Cancer Alley' along the Mississippi River between Baton Rouge and New Orleans has been known as one since the mid-1980s. One of the worst, is dubbed the 'Village of Death' in Shangba, China where from 1987 to 2007 a staggering 250 *Homo sapiens* from the village's population of 3,000 have died of cancer. (190) Very few studies have been conducted to identify cancer clusters throughout the world, although there is definitive evidence they do occur. How many other areas are also potential cancer cluster areas, but have not yet

been studied and identified? How many other victims perhaps live within a cancer cluster area for a portion of their life and then die in another area, thus being statistically eliminated? Don Hardy Jr. and Dana Nachman's 2013 documentary *'The Human Experiment'* details the hidden effects toxic chemicals are having on society.

Synthetic Plastic

Since 1950, the world has produced 8,300,000,000 metric tons of synthetic plastic, with 79% now in landfills or the natural environment, 12% having been incinerated, and 9% of which has been recycled. (433) Synthetic plastic is used for nearly everything *Homo sapiens* utilize or consume, and it has replaced 100% natural biodegradable materials that were once solely used around 75 years ago. Unlike organic debris, which biodegrades, the photodegraded plastic disintegrates into ever smaller pieces while remaining a polymer, and this process continues down to the molecular level. As it disintegrates, the plastic ultimately becomes small enough to be ingested by nearly every sized living organism, in this way, plastic can also bioaccumulate up food chain. The U.S. Fish and Wildlife estimates that each year some 5 tons of plastic is fed to albatross chicks at Midway Atoll, some dying as a result. Over 90% of some 320,000 Laysan albatross chicks at the Midway Atoll contain plastic in the proventriculus and gizzard portions of their stomachs, with the most commonly identifiable objects being bottle caps, cigarette lighters, and plastic toys. (652) A 2009 study on the accumulation and fragmentation of plastic debris in global environments stated,

"The longevity of plastic is estimated to be hundreds to thousands of years, but is likely to be far longer in deep sea and non-surface polar environments. Plastic debris poses considerable threat by choking and starving wildlife, distributing non-native and potentially harmful organisms, absorbing toxic chemicals and degrading to micro-plastics that may subsequently be ingested."

"Like many anthropogenic impacts on natural systems, it is one that, despite widespread recognition of the problem, is still growing and even if stopped immediately will persist for centuries."

"The accumulation of both macro- and micro-plastics has consistently increased on shores and in sediments for the last four decades...Such compounds do deteriorate in ultraviolet (UV) light, but haline environments and the cooling effect of the sea mean degradation require very long exposure times. Because plastics become fouled by marine organisms relatively quickly, the debris may also become shielded to some extent from UV light, and the persistence of this debris was recently illustrated by accounts that plastic swallowed by an albatross had originated from a plane shot down 60 years previously some 9600 km away."

"Durability of plastic ensures that wherever it is, it does not 'go-away'; that is, by placing plastics in landfill we may simply be storing a problem for the future. Although accumulation of plastics on land is important, little information is available on the amounts, rates, fate or impacts, whereas there has been a major effort to quantify impacts on shorelines and at sea."

"There has been a rapid and substantial increase in anthropogenic debris on the ocean surface and beaches over recent decades, but of more pertinence now are the current spatial trends. Similarly, the occurrence of macro-plastics associated with wildlife (e.g. in bird nests and stomachs, entangling seals, strangling a wide variety of vertebrates or even used by hermit crabs instead of shells;) also drastically increased."

"We know much less about the use by and distribution of organisms that hitch hike on plastics and other anthropogenic debris than about the debris itself. Macro- and mega-plastics have the potential to carry a wide range of species and support the growth of many to reproductive viability. The high abundance, lengthy durability and travel of plastics to even the most remote coasts make them a major potential vector for the dispersal of organisms."

"Change in the nature, presence or abundance of anthropogenic debris on the sea floor is much less widely investigated than surface patterns. Studies that investigate seabed debris typically focus on continental shelves, and research into the deeper seabed, which forms about half the planet's surface, is restricted by sampling difficulties and cost."

"Plastics have been found on the seabed of all seas and oceans across the planet..."

"Large rivers are responsible for substantial inputs of debris to the sea bed."

"Most polymers are highly persistent in the marine environment and only degrade slowly via photo-catalysis when exposed to UV radiation. Estimates for the longevity of plastics are variable but are believed to be in the range of hundreds or even thousands of years depending on the physical and chemical properties of the polymer, but this is likely to be greatly increased at depth where oxygen concentrations are low and light is absent."

"It is considered that (with the exception of materials that have been incinerated) all of the conventional plastic that has ever been introduced into the environment still remains to date unmineralized either as whole items or as fragments. However, since we have only been massproducing conventional plastics for around 60 years, it is too early to say exactly how long these materials will persist. Despite the durability of these polymers, plastic items are fragmenting in the environment as a consequence of prolonged exposure to UV light and physical abrasion."

"Fragments of plastic can be identified using Fourier transform infrared (FT-IR) spectroscopy to match spectra obtained from unknown debris items to those of known polymers. Using this approach, a range of common polymers including polypropylene, polyethylene and polyester have been identified as fragments and microscopic fragments. These materials have a wide range of domestic and industrial uses from rope and packaging to clothing, and it seems likely that the fragments are forming from the breakdown of a wide range of everyday plastic products. In addition to this 'natural' deterioration, it has been suggested that plastic items are also deliberately being shredded on board some ships in order that plastic waste can be concealed in food waste discharged at sea."

"Hence, it is apparent that small items of plastic are entering the environment directly and that larger items of debris are fragmenting. The accumulation of plastic fragments is of particular concern because they are difficult to remove from the environment and because they have the potential to be ingested by a much wider range of organisms than larger items of debris. Marine mammals, turtles and numerous other organisms are known to ingest large items of plastic including bags and bottles. Smaller fragments can be ingested by birds, fish and invertebrates. Upon ingestion, it is possible that these small fragments may present a physical hazard in a similar way to larger items of debris by clogging feeding appendages or the digestive system. Microscopic fragments are also taken up from the gut into other body tissues hazards presented by this debris, it has also been suggested that plastics could transfer harmful chemicals to living organisms. A range of chemicals are used as additives in the manufacture of plastics. These increase the functionality of the plastics, but some such as phthalate plasticizers and brominated flame retardants are potentially harmful and have been associated with carcinogenic and endocrine disrupting effects. In seawater, plastics are also known to sorb and concentrate contaminants, which have arisen in the environment from other sources. These contaminants include persistent organic 'pollutants' such as polychlorinated biphenyls (PCBs), dichlorodiphenyldichloroethylene (DDE), nonylphenol and phenanthrene, which can become several orders of magnitude more concentrated on the surface of plastic debris than in the surrounding seawater. It has been widely suggested that these sorbed contaminants and the chemicals additives that are used in manufacture could subsequently be released if the plastics are ingested. Small and microscopic plastic fragments present a likely route for the transfer of these chemicals because they have a much greater surface area to volume ratio than larger items of debris from which they have originated and because of their size they are available to a wide range of organisms, including deposit feeders such as the lug worm, *Arenicola marina*, that feed by stripping organic matter from particulates. Recent in vitro modelling studies predict that even very small quantities of micro-plastic have the potential to significantly increase the transport of phenanthrene to *A. marina* and work in this volume has examined the uptake of contaminants from plastics by birds.

Given current levels of production and the quantities of plastic that are already present in the environment, it seems inevitable that the abundance of plastic fragments will continue to increase for the foreseeable future."

"Less than 60 years ago, the mass production of plastics started and now most items that people use, virtually anywhere on the planet are partly or wholly made of this inexpensive, durable material." (46)

Ironically the president of DuPont Corporation, the inventor of plastic, Lamot DuPont boasted in a June 1939 Popular Mechanics interview about how plastic had actually helped preserve nature by replacing products made of natural materials, but as history has shown, it has in fact done just the opposite by inflicting mass pollution on a global scale and killing nature in the process. DuPont stated,

"Synthetic plastics find application in fabricating a wide variety of articles, many of which in the past were made from natural products. Considering our natural resources, the chemist has aided in conserving natural resources by developing synthetic products to supplement or wholly replace natural products." (104)



SOURCE: Albatross chicks at Midway Atoll with ingested plastic. - John Klavitter - US Fish & Wildlife Service

In 1973, DuPont patented polyethylene terephthalate (PET) which was the first plastic that could withstand the pressure of carbonated liquids, and plastic bottles began replacing the natural and truly recyclable alternatives being used which were aluminum and glass. Today, many liquids consumed are in a plastic bottle, and since 1973, trillions of plastic bottles have been produced, used once, and discarded into a landfill or onto the surface of the Earth. In 2016, there were 480,000,000,000 plastic drinking bottles sold, which equates to 15,220 bottles being bought every second. (435) If the entire world had access to free clean drinkable water instead of being sold water in a plastic bottle to make a profit, how many billions of less water bottles would be consumed? There are thousands of types of plastics which are manufactured for a wide range of uses, below is a list of some of the more common ones used.

Some Common Synthetic Plastics	
Name	Description
Phthalates	<p>Phthalates are used in a large variety of products, from enteric coatings of pharmaceutical pills and nutritional supplements to viscosity control agents, gelling agents, film formers, stabilizers, dispersants, lubricants, binders, emulsifying agents, and suspending agents. End applications include adhesives and glues, agricultural adjuvants, building materials, personal-care products, medical devices, detergents and surfactants, packaging, children's toys, modelling clay, waxes, paints, printing inks and coatings, pharmaceuticals, food products, and textiles. Phthalates are also frequently used in soft plastic fishing lures, caulk, paint pigments, and sex toys made of so-called "jelly rubber". Phthalates are used in a variety of household applications such as shower curtains, vinyl upholstery, adhesives, floor tiles, food containers and wrappers, and cleaning materials. Personal care items containing phthalates include perfume, eye shadow, moisturizer, nail polish, liquid soap, and hairspray. Phthalates are also found in modern electronics and medical applications such as catheters and blood transfusion devices. The most widely used phthalates are di(2-ethylhexyl) phthalate (DEHP), diisodecyl phthalate (DIDP), and diisononyl phthalate (DINP). DEHP was the dominant plasticizer used globally in PVC due to its low cost. Benzylbutylphthalate (BBP) is used in the manufacture of foamed PVC, which is used mostly as a flooring material, though its use is decreasing rapidly in the Western countries. Phthalates with small R and R' groups are used as solvents in perfumes and pesticides. Approximately 8.4 million tonnes of plasticizers are consumed globally every year, of which European consumption accounts for approximately 1.5 million metric tonnes. Approximately 70% of those totals are phthalates, down from about 88% in 2005. The remaining 30% are alternative chemistries. Plasticizers contribute 10-60% of total weight of plasticized products.</p> <p>People are commonly exposed to phthalates, and most people in the US tested by the Centers for Disease Control and Prevention have metabolites of multiple phthalates in their urine. Recent human biomonitoring data shows that the tolerable intake of children is exceeded to a considerable degree, in some instances up to 20-fold. Because phthalate plasticizers are not chemically bound to PVC, they can easily leach and evaporate into food or the atmosphere. Phthalate exposure can be through direct use or by indirect means through leaching and general environmental contamination. Diet is believed to be the main source of DEHP and other phthalates in the general population. Fatty foods such as milk, butter, and meats are a major source. Low molecular-weight phthalates such as DEP, DBP, BbzP may be dermally absorbed. Inhalational exposure is also significant with the more volatile phthalates.</p>
Polyester	<p>Fabrics woven or knitted from polyester thread or yarn are used extensively in apparel and home furnishings, from shirts and pants to jackets and hats, bed sheets, blankets, upholstered furniture and computer mouse mats. Industrial polyester fibers, yarns and ropes are used in tire reinforcements, fabrics for conveyor belts, safety belts, coated fabrics and plastic reinforcements with high-energy absorption. Polyesters are also used to make bottles, films, tarpaulin, canoes, liquid crystal displays, holograms, filters, dielectric film for capacitors, film insulation for wire and insulating tapes. Polyesters are widely used as a finish on high-quality wood products such as guitars, pianos and vehicle/yacht interiors. A team at Plymouth University in the UK spent 12 months analysing what happened when a number of synthetic materials were washed at different temperatures in domestic washing machines, using different combinations of detergents, to quantify the microfibrils shed. They found that an average washing load of 6 kg could release an estimated 137,951 fibres from polyester-cotton blend fabric, 496,030 fibres from polyester and 728,789 from acrylic. Those fibers add to the general microplastics pollution.</p>
Polyethylene terephthalate (PET)	<p>Because PET is an excellent water and moisture barrier material, plastic bottles made from PET are widely used for soft drinks. Biaxially oriented PET film (often known by one of its trade names, "Mylar") can be aluminized by evaporating a thin film of metal onto it to reduce its permeability, and to make it reflective and opaque (MPET). These properties are useful in many applications, including flexible food packaging and thermal insulation. See: "space blankets". Because of its high mechanical strength, PET film is often used in tape applications, such as the carrier for magnetic tape or backing for pressure-sensitive adhesive tapes. Commentary published in Environmental Health Perspectives in April 2010 suggested that PET</p>

	might yield endocrine disruptors under conditions of common use and recommended research on this topic. Proposed mechanisms include leaching of phthalates as well as leaching of antimony.
Polyethylene	Polyethylene is the most common plastic. Its primary use is in packaging (plastic bags, plastic films, geomembranes, containers including bottles, etc.). One of the main problems of polyethylene is that without special treatment it's not readily biodegradable, and thus accumulates.
Polyvinyl chloride (PVC)	PVC comes in two basic forms: rigid (sometimes abbreviated as RPVC) and flexible. The rigid form of PVC is used in construction for pipe and in profile applications such as doors and windows. It is also used for bottles, other non-food packaging, and cards (such as bank or membership cards). It can be made softer and more flexible by the addition of plasticizers, the most widely used being phthalates. In this form, it is also used in plumbing, electrical cable insulation, imitation leather, signage, phonograph records, inflatable products, and many applications where it replaces rubber. Degradation during service life, or after careless disposal, is a chemical change that drastically reduces the average molecular weight of the polyvinyl chloride polymer. Since the mechanical integrity of a plastic depends on its high average molecular weight, wear and tear inevitably weakens the material. Weathering degradation of plastics results in their surface embrittlement and microcracking, yielding microparticles that continue on in the environment. Also known as microplastics, these particles act like sponges and soak up Persistent Organic Pollutants (POPs) around them. Thus laden with high levels of POPs, the microparticles are often ingested by organisms in the biosphere. The metal lead had previously been frequently added to PVC to improve workability and stability. Lead has been shown to leach into drinking water from PVC pipes. In the early 1970s, the carcinogenicity of vinyl chloride (usually called vinyl chloride monomer or VCM) was linked to cancers in workers in the polyvinyl chloride industry. Specifically workers in polymerization section of a B.F. Goodrich plant near Louisville, Kentucky (US) were diagnosed with liver angiosarcoma also known as hemangiosarcoma, a rare disease. Since that time, studies of PVC workers in Australia, Italy, Germany, and the UK have all associated certain types of occupational cancers with exposure to vinyl chloride, and it has become accepted that VCM is a carcinogen.
Polypropylene	Polypropylene (PP), also known as polypropene, is a thermoplastic polymer used in a wide variety of applications including packaging and labeling, textiles (e.g., ropes, thermal underwear and carpets), stationery, plastic parts and reusable containers of various types, laboratory equipment, loudspeakers, automotive components, and polymer banknotes. An addition polymer made from the monomer propylene, it is rugged and unusually resistant to many chemical solvents, bases and acids. Polypropylene is the world's second-most widely produced synthetic plastic, after polyethylene.
Polystyrene	Uses include protective packaging (such as packing peanuts and CD and DVD cases), containers (such as "clamshells"), lids, bottles, trays, tumblers, and disposable cutlery. In the United States and Canada, the word styrofoam refers to expanded (not extruded) polystyrene foam, such as disposable coffee cups, coolers, or cushioning material in packaging, which is typically white and is made of expanded polystyrene beads. Polystyrene is very slow to biodegrade and is therefore a focus of controversy among environmentalists. It is increasingly abundant as a form of litter in the outdoor environment, particularly along shores and waterways, especially in its foam form, and also in increasing quantities in the Pacific Ocean. Discarded polystyrene does not biodegrade for hundreds of years and is resistant to photolysis. China banned expanded polystyrene takeout/takeaway containers and tableware around 1999. However, compliance has been a problem and, in 2013, the Chinese plastics industry is actively lobbying to get the ban repealed. Polystyrene is commonly used in containers for food and drinks. The styrene monomer (from which polystyrene is made) is a cancer suspect agent. Styrene is "generally found in such low levels in consumer products that risks aren't substantial". Polystyrene which is used for food contact may not contain more than 1% (0.5% for fatty foods) of styrene by weight. Styrene oligomers in polystyrene containers used for food packaging have been found to migrate into the food. Another Japanese study conducted on wild-type and AhR-null mice found that the styrene trimer, which the authors detected in cooked polystyrene container-packed instant foods, may increase thyroid hormone levels. The National Bureau of Standards Center for Fire Research found 57 chemical by-products released during the combustion of expanded polystyrene foam.
Bisphenol A (BPA)	BPA has been in commercial use since 1957. BPA is employed to make certain plastics and epoxy resins. BPA-based plastic is clear and tough, and is made into a variety of common consumer goods, such as water bottles, sports equipment, CDs, and DVDs. Epoxy resins containing BPA are used to line water pipes, as coatings on the inside of many food and beverage cans and in making thermal paper such as that used in sales receipts. In 2015, an estimated 4 million tons of BPA chemical were produced for manufacturing polycarbonate plastic, making it one of the highest volume of chemicals produced worldwide. In 2006, the US Government sponsored an assessment of the scientific literature on BPA. Thirty-eight experts in fields involved with bisphenol A gathered in Chapel Hill, North Carolina to review several hundred studies on BPA, many conducted by members of the group. At the end of the meeting, the group issued the Chapel Hill Consensus Statement, which stated "BPA at concentrations found in the human body is associated with organizational changes in the prostate, breast, testis, mammary glands, body size, brain structure and chemistry, and behavior of laboratory animals." The Chapel Hill Consensus Statement stated that average

	<p>BPA levels in people were above those that cause harm to many animals in laboratory experiments. It noted that while BPA is not persistent in the environment or in humans, biomonitoring surveys indicate that exposure is continuous. This is problematic because acute animal exposure studies are used to estimate daily human exposure to BPA, and no studies that had examined BPA pharmacokinetics in animal models had followed continuous low-level exposures. The authors added that measurement of BPA levels in serum and other body fluids suggests the possibilities that BPA intake is much higher than accounted for or that BPA can bioaccumulate in some conditions (such as pregnancy). The major human exposure route to BPA is diet, including ingestion of contaminated food and water. Bisphenol A is leached from the lining of food and beverage cans where it is used as an ingredient in the plastic used to protect the food from direct contact with the can. It is especially likely to leach from plastics when they are cleaned with harsh detergents or when they contain acidic or high-temperature liquids. BPA is used to form epoxy resin coating of water pipes; in older buildings, such resin coatings are used to avoid replacement of deteriorating pipes. In the workplace, while handling and manufacturing products which contain BPA, inhalation and dermal exposures are the most probable routes. There are many uses of BPA for which related potential exposures have not been fully assessed including digital media, electrical and electronic equipment, automobiles, sports safety equipment, electrical laminates for printed circuit boards, composites, paints, and adhesives. In addition to being present in many products that people use on a daily basis, BPA has the ability to bioaccumulate, especially in water bodies. In one review, it was seen that although BPA is biodegradable, it is still detected after wastewater treatment in many waterways at concentrations of approximately 1 ug/L. This study also looked at other pathways where BPA could potentially bioaccumulate and found "low-moderate potential...in microorganisms, algae, invertebrates, and fish in the environment" suggesting that some environmental exposures less likely. The CDC had found bisphenol A in the urine of 95% of adults sampled in 1988–1994 and in 93% of children and adults tested in 2003–04. The chemical industry over time responded to criticism of BPA by promoting "BPA-free" products. For example, in 2010, General Mills announced it had found a "BPA-free alternative" can liner that works with tomatoes. It said it would begin using the BPA-free alternative in tomato products sold by its organic foods subsidiary Muir Glen with that year's tomato harvest. As of 2014, General Mills has refused to state which alternative chemical it uses, and whether it uses it on any of its other canned products.</p>
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SOURCE: Wikipedia (with some corrections, additions, and other edits)

Non-biodegradable plastic bags for every sort of packaging are a major source of waste and pollution. Plastic bags have replaced paper bags by merchants due mainly to lower costs and convenience and without any regard of the consequences to the environment. Worldwide, as many as 1,000,000,000,000 plastic bags are used each year, with 380,000,000,000 plastic bags and wraps being used each year in the United States alone. (239) Over the last 50 years, how many trillions of plastic bags have been used in grocery stores, convenient stores, department stores, for product packaging, food storage, etc. and still pollute the Earth today? Many have found a very simple solution to the plastic grocery bag dilemma, by simply using a 100% cotton, hemp, burlap, or other naturally made bag which can be used 1000's of times, and when it does finally wear out it is made from natural materials and thus 100% biodegradable. Why aren't these natural eco-friendly bags being used by more consumers? Why do merchants even give the option of plastic bags, why not simply stop offering them to customers as some conscientious retailers have already begun doing?

Microbeads have been added to personal care products like: toothpastes, shampoos, facial and body scrubs, hand soaps, sunscreens, cosmetics, and other personal care products since the 1990's. But over the last few years, some countries have banned them as they are bioaccumulating in small aquatic faunae, only to later biomagnify up the aquatic food chain. Why can't more natural alternatives like ground oatmeal, cocoa beans, pumice, almonds, apricot pits, sea salt, or another flora based biodegradable alternative be used? How many trillions of these microbeads now pollute marine ecosystems?

Vast amounts of synthetic plastic are used for plasticulture in order to grow agriculture in more hospitable environments. Some of this plastic undoubtedly flakes off into the soils and could possibly contaminate the agricultural products being produced. The use of plasticulture in agriculture is becoming more prevalent around the world in hospitable dry environments which are not intended to naturally sustain agricultural crops, Spain has created such vast areas of plasticulture that the giant collections of plastic are visible from space.



SOURCE: NASA - The sunny south of Spain offers more to the national economy than simply tourism. Over the past 50 years, the small coastal plain (campo), some 30 kilometers southwest of the city of Almería, has been intensively developed for agriculture. An estimated 20,000 hectares of extra-early market produce is grown in greenhouses in the Campo de Dalias, and it accounts for over \$1.5 billion in economic activity. The area has a dry, mild, Mediterranean climate and is further sheltered on the north by the Sierra de Gador mountains. With just slightly more than 200 millimeters of annual precipitation to support crop growth, the area also relies on groundwater fed by small stream aquifers from the mountains to the north. <https://earthobservatory.nasa.gov/IOTD/view.php?id=4508>

Biodegradation of some synthetic plastics has been observed in some species. (e.g. *Pseudomonas fluorescens* with the help of *Sphingomonas*, *Revibacillus borstelensis*, *Plodia interpunctella* larvae, *Ideonella sakaiensis*, *Tenebrio molitor* larvae, *Geotrichum candidum*, *Phanerochaete chrysosporium*, *Portulaca oleracea*, *Cunninghamella elegans*, endophytic fungi, etc.) In March 2011, bacteria-like cells were found in the Sargasso Sea which were consuming plastic, but it is unknown if these bacteria ultimately clean up the toxic plastic or are simply passing the toxins along the food chain. (19) Similar terrestrial plastic consuming bacteria have also been found in landfills. Could these species be nature's bioremediation solution for cleaning up *Homo sapiens* plastic legacy? Will nature be the one to recycle *Homo sapiens* plastic waste, or could it be the beginning of a whole other range of problems? Will *Homo sapiens* convert more to using biodegradable polymers from natural flora sources instead of using synthetically created polymers from petroleum or other chemicals? Will BASF, DuPont, Dow Chemicals, and other chemical manufacturing companies one day be held responsible and made to clean-up the plastic mess they have created on Earth? Why don't more countries have a similar Verpackungsverordnung type law like Germany, which makes companies responsible for the waste they create? Should not the companies be more responsible for the recycling of their products? Should not the companies be held liable for the damage their products do to Earth even after it has been sold and consumed? Should not these companies be held responsible for the cleanup of Earth as it is their products which are polluting nearly every square inch of Earth? If companies who are manufacturing all the containers to put their products in were responsible for it even after the product had been sold and consumed, would there not be more of an effort to make the containers eco-friendlier and biodegradable? Warning labels are on nearly every consumer product for safety and toxicity awareness, should there not be a warning label on all plastic products which says, **"WARNING: THIS PRODUCT IS MADE FROM SYNTHETIC PLASTIC AND IS NON-BIODEGRADABLE AND TOXIC TO EARTH. IT WILL REMAIN ON EARTH FOR 1,000 YEARS OR MORE IN SOME FORM!"** Do *Homo sapiens* not notice the food and drink residue and stains on plastic dishes and containers which also result in lingering rotten food odors on the dish? Glass, ceramic, and metal containers do not have this issue when they

are cleaned the food and drink residue is completely gone. How many billions of microscopic fragments of plastic have been ingested by consumers through eating and drinking? How many of these microscopic fragments of plastic are ingested by consumers simply due to the food being packaged or stored in plastic containers? How many microscopic fragments of plastic flake off into food from using a plastic cutting board, plastic eating utensils, or other plastic kitchenware?

As a result of research done by George Washington Carver in August 1941, Henry Ford unveiled a lighter more fuel-efficient automobile engineered from soybean and powered by a hemp-based fuel. And more recently in 2017 students in the Netherlands built an electric car made of a resin which was derived from sugar beets and an outer shell made with flax. (113) Since the early 1950's, a 100% biodegradable plastic known as bioplastic made from the starches, cellulose, or proteins of flora have been known about and researched. And yet, of the nearly 300,000,000 tons of plastic produced each year only about 1% or 4,200,000 tons is bioplastic. (238) Even today further advancements have been made in the field of bioplastics making them a better option than the synthetic chemical-based plastics. A report published in December 2017 on renewable acrylonitrile production stated,

"Much of the attention directed toward displacing petroleum feedstocks with biomass has focused on fuels. However, there are also numerous opportunities in commodity chemical production. One such candidate is acrylonitrile, a precursor to a wide variety of plastics and fibers that is currently derived from propylene. Karp et al. efficiently manufactured this compound from an ester (ethyl 3-hydroxypropanoate) that can be sourced renewably from sugars. The process relies on inexpensive titania as a catalyst and avoids the side production of cyanide that accompanies propylene oxidation.

Acrylonitrile (ACN) is a petroleum-derived compound used in resins, polymers, acrylics, and carbon fiber. We present a process for renewable ACN production using 3-hydroxypropionic acid (3-HP), which can be produced microbially from sugars. The process achieves ACN molar yields exceeding 90% from ethyl 3-hydroxypropanoate (ethyl 3-HP) via dehydration and nitrilation with ammonia over an inexpensive titanium dioxide solid acid catalyst. We further describe an integrated process modeled at scale that is based on this chemistry and achieves near-quantitative ACN yields ($98 \pm 2\%$) from ethyl acrylate. This endothermic approach eliminates runaway reaction hazards and achieves higher yields than the standard propylene ammoxidation process. Avoidance of hydrogen cyanide as a by-product also improves process safety and mitigates product handling requirements." (668)

Yes, there is far too much consumption in the world and this is part of the problem, but it's not so much what is being done, but rather more of how it is being done and what is being used to do it. If plastic were made out of natural flora-based substances it would easily biodegrade and be far less impactful to the Earth not only in terms of toxicity, but also in the amount of time it takes to fully degrade. There is also an erroneous argument that bioplastics could never be produced on a mass scale because there is not enough global agricultural land to grow food and bioplastics, but the European bioplastic Association stated,

"The land used to grow the renewable feedstock for the production of bioplastics amounted to approximately 0.68 million hectares in 2014, which accounted for only 0.01 percent of the global agricultural area of 5 billion hectares, 97 percent of which were used for pasture, feed, food, other material uses, bioenergy, and biofuels. This clearly shows that there is no competition between the renewable feedstock for food, feed, and the production of bioplastics." (238)

So why then aren't bioplastics used more, and why is it taking so long to implement their use on a mass scale? What would the world be like today if the soybean and hemp automobile would have been the standard automobile type? How much less polluted would the Earth be if chemurgy were pursued more intensely and bioplastics were used initially instead of synthetic plastics? Why use such a highly toxic non-biodegradable substance for so many applications when alternative more natural bio-degradable materials exist? Up until the 1960s, and for thousands of years before, chewing gum was made with all-natural ingredients from trees, but today most all chewing gum is made with butadiene-based synthetic rubber. How many thousands of pieces of chewing gum are discarded into the environment each day? How many billions of pieces of chewing gum litter the cities of the world?

Depending on environmental factors a piece of trash like an aluminum can still be around after 100 years or more. But how long will a piece of plastic really last, some estimate 1,000 years, others estimate 10,000 years or perhaps even more, and the truth is these are just estimates as no one really knows for sure, because plastic has only been around for around 100 years. Plastic degradation varies based on the type of plastic, but either way

when it does break down it will only break down into more tiny pieces. Unless it has been incinerated, nearly every piece of plastic ever made is still on Earth today in either its original form, or at the microscopic level. Perhaps one day there will just be a fine plastic dust covering most of Earth's surfaces? *Homo sapiens* have in essence become a species which live within a plastic world, as plastic is in nearly every single aspect of life with everything that was once made of nature biodegradable materials being replicated and replaced with synthetic plastic.

Cannabis

When cannabis was outlawed through the enactment of the Marihuana Tax Act of 1937, this was the defining moment in history when synthetically made plastic from toxic unnatural chemicals began dominating the manufacturing of almost everything made. It was the start of mass pollution and mass consumption on a scale in which the world had never experienced before, and the 'throw-away-buy a new one' consumer was born which has since taken corporations and their greed to an entirely new realm. And to think, it all started with something as simple as outlawing and attempting to eradicate a species of flora which has thrived on Earth for millions of years and has been used by *Homo sapiens* for thousands of years, as can be seen at the multiple archeological sites containing cannabis fragments. For the real history of cannabis, one need only read Jack Herer's book, *The Emperor Wears No Clothes* or watch Ron Mann's 1999 documentary *'Grass: History of Marijuana'*. When a society begins to make nature illegal and incarcerates *Homo sapiens* for innumerable amounts of time levying heavy fines for growing or possessing nature which is harmless, there is a serious imbalance within society and further evidence of the lost connection with nature.

Most have no idea what hemp is, if they have ever even heard of it, nor do they know that hemp and marijuana are two separate subspecies of cannabis and have completely different uses. Cannabis is often associated with the hippies of the 1960s, but most do not even know the truth as to why cannabis was made illegal, and many just think it is because cannabis is a drug like heroin or cocaine, that smoking it is dangerous, that the government deems it illegal so therefore it must be wrong and bad to use. But these erroneous assumptions which have perpetuated throughout the last 80 years are far from the truth and are based on a lie which has proliferated through nothing more than ignorance. The reality is, that for more than 20 years using bigotry and racism as a theme to create disinformation and lies via a media propaganda blitz through a media monopoly, Hearst and DuPont along with the help of Harry J. Anslinger, succeeded in gaining public support through their scare tactics to get Congress to enact the Marijuana Tax Act of 1937. Scare tactics which still have a rippling effect even today with many having misconceptions and unwarranted fear of cannabis. The cult classics like Louis J. Gasnier's 1936 *'Reffer Madness'*, Dwain Esper's 1936 *'Marihuana'*, and Elmer Clifton's 1937 *'Assassin of Youth'* are all prime examples of this ludicrity, but which in fact helped to sway a gullible public. Shan Clark stated,

"The proof of a successful conspiracy among these corporate and governing interests is simply this: In 1991 DuPont was still the largest producer of man-made fibers, while no citizen has legally harvested a single acre of textile grade hemp in over 50 years." (104)

And while the campaign was successful in eliminating cannabis from competing in the early years of textiles, the efforts, much like Prohibition in the United States, were futile in keeping cannabis from being used as a medicine and recreational drug on the black market. In fact, the recent legalization of cannabis in 46 U.S. states and even in Washington D.C. itself for either medicinal and recreational has ultimately thwarted the federal government's efforts to keep this valuable and harmless natural resource from being used. In December 1840, Abraham Lincoln said,

"Prohibition...goes beyond the bounds of reason in that it attempts to control a man's appetite by legislation and makes a crime out of things that are not crimes...A prohibition law strikes a blow at the very principles upon which our government was founded." (103)

And in 1660 Spinoza stated,

“All laws which can be violated without doing any one any injury are laughed at.” (103)

What was the real reason behind this campaign? Nothing more than money, power, and greed. Jack Herer wrote,

“When mechanical hemp fiber stripping machines and machines to conserve hemp's high-cellulose pulp finally became state-of-the-art, available and affordable in the mid-1930's, the enormous timber acreage and businesses of the Hearst Paper Manufacturing Division, Kimberly Clark (USA), St. Regis and virtually all other timber, paper and large newspaper holding companies stood to lose billions of dollars and perhaps go bankrupt.

Coincidentally, in 1937 DuPont had just patented processes to make plastics from oil and coal, as well as new sulfate/sulfite processes to make paper from wood pulp which would, according to their own corporate records and historians, account for over 80% of all its railroad car loadings for the next 50 years.

If hemp had not been made illegal, 80% of DuPont's business would never have come to be; nor would the great majority of the pollution which has been inflicted on our Northwestern and Southeastern rivers have ever occurred.” (712)

Although hemp and marijuana are both subspecies of cannabis there are two major differences, in that marijuana can alter the state of consciousness whereas hemp cannot, and hemp is used as a textile, food resource, and making cosmetics whereas marijuana is not. Before the war on cannabis began, the words hemp and cannabis were used while marijuana was an unknown word in the English language. So why then is the word marijuana now used more often and not the older term hemp or the scientific term cannabis? Why was the name changing so important, and who initiated this change and how? Jack Herer wrote,

“After the seizure of 800,000 acres of Hearst's prime Mexican timberland by the “marihuana” smoking army of Pancho Villa, these slurs intensified. Non-stop for the for the next three decades, Hearst painted a picture of the lazy pot-smoking Mexican still one of our most insidious prejudices.”

“...Hearst through repetitive use, pounded the obscure Mexican slang word 'marijuana' into the English-speaking American consciousness. 'Hemp' was discarded. 'Cannabis,' the scientific term, was ignored or buried.”

“Virtually no one in America other than a handful of rich industrialists and their hired cops knew that their chief potential competitor-hemp- was being outlawed under the name marijuana” (709)

This prohibition of cannabis had devastating environmental and social consequences which are still occurring even today. The Earth is now severely polluted because of using synthetic unnatural chemicals instead of cannabis, an all-natural biodegradable alternative. Millions of lives have been destroyed or forever negatively impacted and altered as a result of the Marijuana Tax Act of 1937 through arrest and even imprisonment for the possession and cultivation of cannabis. Billions of tax payer dollars have been wasted to wage a hopeless and senseless campaign of eradication on a species of flora, whereas billions of dollars could have been collected on the taxation of its use as is currently being done at the state level. Bills Hicks said,

“Why is marijuana against the law, it grows naturally upon our planet. Doesn't the idea of making nature against the law seem to you a bit paranoid? You know what I mean, it's nature how do you make nature against the fucking law? Grows everywhere, serves a thousand different functions, all of them positive, to make marijuana against the law is like saying God made a mistake.” (683)

But the unjustified persecution of cannabis users began hundreds of years prior to Hearst and DuPont and from a likely source, the Roman Catholics. Jack Herer states that,

“While embracing wine as a Sacrament, and tolerating beer and hard liquor, the Inquisition outlawed cannabis ingestion in Spain in the 12th century, and France in the 13th. Many other natural remedies were simultaneously banned. Anyone using hemp to communicate, heal or otherwise was labeled “witch.”

Saint Joan of Arc for example was accused in 1430-31 of using a variety of herbal “witch” drugs, including cannabis, to hear voices.”

“In 1484, Pope Innocent VIII singled out cannabis healers and other herbalists, proclaiming hemp an unholy sacrament of the second and third types of satanic mass. This persecution lasted for more than 150 years.” (707)

During World War II hemp was so vital, that when the Japanese cut off supplies of hemp to the United States the

USDA made a film titled '*Hemp for Victory*' and American farmers were encouraged to begin growing it again temporarily during the war. The commercial market which was once robust with paper, rope, food, and other products made from hemp fibers in the not too distant past, around 100 years ago before the prohibition of cannabis, could once again thrive. Only now, with the advancements made in technology and science the cannabis plant could be used for a vast array of far more things. Nolan Kane an evolutionary biologist from the University of Colorado Boulder told National Geographic Magazine in June 2015,

"Hemp produces fibers of unparalleled quality. It's a tremendously high biomass crop that replenishes the soil and doesn't require much in terms of inputs. We import tons and tons of hemp each year from China and even Canada, yet as a matter of federal policy, we can't legally grow it. There are places where farmers in the U.S. can literally look across the Canadian border and see fields that are yielding huge profits.

So much of science is incremental but with this cannabis work, the science will not be incremental. It will be transformative. Transformative not just in our understanding of the plant but also of ourselves—our brains, our neurology, our psychology. Transformative in terms of the biochemistry of its compounds. Transformative in terms of its impact across several different industries, including medicine, agriculture, and biofuels. It may even transform part of our diet—hemp seed is known to be a ready source of a very healthy, protein-rich oil."

The United States DEA states that, **"NO deaths from an overdose of marijuana has ever been reported"**, (537) whereas alcohol, tobacco, and prescription drugs have killed millions, and continue to only claim more lives. Globally, alcohol is responsible for more than 3,300,000 deaths and is a causal factor in more than 200 diseases and injurious conditions. (609) How different would society be if cannabis, which has killed 0 *Homo sapiens*, was legal and was the recreational drug available and marketed, versus artificially created and toxic alcohol? The hypocrisy which thrives even today towards cannabis versus alcohol, tobacco, and prescription drugs is insane. How can one regulate and condone products which are known to cause major health and/or mental issues and even death, (e.g. cigarettes, alcohol, prescription drugs, etc.) and yet make cannabis illegal which has never been scientifically proven to cause any adverse health effects, and in fact could alleviate, cure, or prevent many medical issues? A recent study conducted in the United States, found that in states which had legal medical marijuana, there was an average 23% less hospitalizations for opioid painkiller dependence and abuse, while hospitalization rates for opioid overdoses declined 13% on average. Another 2014 study, showed a 25% decline in opioid overdose deaths in states that legalized medical marijuana. (484)

Although cannabis is illegal, in 2001 the United States government hypocritically filed a patent for cannabinoids as antioxidants and neuroprotectants. In their abstract they stated,

"Cannabinoids have been found to have antioxidant properties, unrelated to NMDA receptor antagonism. This new found property makes cannabinoids useful in the treatment and prophylaxis of wide variety of oxidation associated diseases, such as ischemic, age-related, inflammatory and autoimmune diseases. The cannabinoids are found to have particular application as neuroprotectants, for example in limiting neurological damage following ischemic insults, such as stroke and trauma, or in the treatment of neurodegenerative diseases, such as Alzheimer's disease, Parkinson's disease and HIV dementia.

Nonpsychoactive cannabinoids, such as cannabidiol, are particularly advantageous to use because they avoid toxicity that is encountered with psychoactive cannabinoids at high doses useful in the method of the present invention." (222)

Aside from the recreational uses and creative stimulation which cannabis is so commonly associated with, cannabis has a wide variety of medical applications too. Ancient medical practitioners in China, India, and Greece are known to have used cannabis for its medicinal qualities. In the United States, cannabis was the number one analgesic before the rediscovery of aspirin around 1900. Cannabis also made up half of all the medicine sold between 1842 and 1900 in the United States. Cannabis was prescribed by American doctors as the primary medicine to cure or alleviate symptoms for more than 100 different illnesses or diseases between 1850 and 1937. (708) Today, modern *Homo sapiens* once again are utilizing cannabis to help in the treatment of a wide range of medical ailments like: AIDS, arthritis, asthma, cancer, epilepsy, multiple sclerosis, Crohn's disease, glaucoma, inflammation, seizures, and Tourette's syndrome, stress, migraines, insomnia, and a host of other medical conditions. Cannabis can even be used for appetite loss which other diseases may cause or which can occur as a result of a side-effect from the consumption of other medicines. Cannabis can also be used as an antibiotic and antibacterial agent. Scientific research on medical marijuana has shown that it can be used as an analgesic, an antiemetic, a bronchodilator, and an anti-inflammatory, but as serious research on cannabis for

medical science has just begun, there may be many new possible uses in the medical treatment of diseases and disorders such as amyotrophic lateral sclerosis, dementia, multiple sclerosis, osteoporosis, post-traumatic stress disorder, schizophrenia, and psoriasis. In Spain, Manuel Guzmán of Complutense University of Madrid has studied Marijuana for 20 years in his lab which specializes in cancer and neurodegenerative diseases. In a study, Guzmán and his colleagues injected brain tumors into rats and treated them with a combination of THC, CBD, and temozolomide over a period of 15 years and their results showed that the cancer tumors in 1/3 of the rats were eradicated, while another 1/3 of the rats had their cancer tumors reduced. His research has led to clinical trials of a drug in England. Len Richmond's 2010 documentary *'What If Cannabis Cured Cancer'* details the research and potential of cannabis as a cancer drug.

In addition to the medical applications cannabis has, the hemp fiber and the oil from hemp seeds has a wide range of uses, perhaps more than any other flora species on the Earth. It can be used to create natural and biodegradable fabric, paper, food, paints, pressed board, cosmetics, and many other things. The applications are so numerous that it could theoretically replace nearly all synthetically created plastics made from toxic chemicals, as even the cellulose can be made into an eco-friendly plastic. Hemp could also help to dramatically reduce the number of trees being harvested for paper as well as the amount of toxic chemicals being used to process the paper from trees. Jack Herer wrote,

“In 1916, USDA Bulletin No.404 reported that one acre of cannabis hemp, in annual rotation over a 20-year period, would produce as much pulp for paper as 4.1 acres of trees being cut down over the same 20-year period. This process would use only 1/4 to 1/7 as much polluting sulfur-based acid chemicals to break down the glue-like lignin that binds the fibers of the pulp, or even none at all using soda ash. The problem of dioxin contamination of rivers is avoided in the hemp paper making process, which does not need to use chlorine bleach (as the wood pulp paper making process requires) but instead substitutes safer hydrogen peroxide in the bleaching process.” (710)

The first cannabis laws enacted in 1619 in the United States at Jamestown Colony, Virginia did not outlaw cannabis, but rather promoted its growth by requiring all farmers to grow hemp, and later similar laws were enacted in Massachusetts, Connecticut, and in the Chesapeake Colonies. In fact, one could even be jailed for not growing hemp during the several periods when there was a shortage. George Washington and Thomas Jefferson both grew cannabis. Cannabis was legal tender in the United States between 1632 and the early 1800's, and one could also pay their taxes with it. *'Old Glory'* was at one time even made with hemp fibers. Rembrandt, Van Gogh, Gainsborough, and many other artists painted primarily on a hemp canvas. As hemp can be grown almost anywhere, even under adverse conditions, it helped Australians survive two prolonged famines in the 19th century when they used mostly hemp seeds for protein and hemp leaves for roughage. (713) Hemp has been so important throughout world history for thousands of years simply because it is the most durable and strongest natural fiber known to exist on Earth. Jack Herer wrote,

“...by using 100% hemp or mixing 20-50% hemp with 50-80% cotton, you will be able to pass on your shirts, pants and other clothing to your grandchildren. Intelligent spending could essentially replace the use of petrochemical synthetic fibers such as nylon and polyester with tougher, cheaper, cool, absorbent, breathing, biodegradable, natural fibers.” (711)

Science Fiction writer George Clayton Johnson had a wonderful vision of a hemp future. He stated,

“As a science fiction writer, this view of an altered world of clean skies and lush forests, filled with freedom-loving people living in hemp houses, driving their hemp-fueled cars down hemp-lined freeways, dressed in their hemp finery, eating their hemp tofu salad is very appealing to me.” (714)

Since border security was tightened after the September 11th terrorist attacks, international drug organizations are now sending growers into the United States or employing stateside residents to grow in these remote ecosystems. These illegal cannabis cultivation operations negatively impact these once pristine ecosystems by bringing in vast amounts of plastic and other trash, poisoning deer and other faunae which forage on the marijuana crop, dumping highly concentrated toxic fertilizers and pesticides, employing booby traps, running PVC piping for irrigation, and even altering the landscape itself. In 2017, the U. S. Forest Service identified more than 400 illegal marijuana grow sites on U.S. Forest Service land in California alone, and illegal cannabis cultivation operations are as far east as North Carolina. In 2016, U.S. Forest Service staff and their partners

removed more than 11,000 pounds of trash, along with 1,250 pounds of fertilizer and numerous other toxic chemicals from just one illegal cannabis cultivation site. (671) Once a cannabis grow site has been raided the site must then be cleaned up, but they are never 100% cleaned as there are such vast amounts of trash and chemicals. The January 22, 2009 CNBC report '*Marijuana Inc.: Inside America's Pot Industry*' details the illegal cannabis cultivation issue in part. If cannabis were not senselessly outlawed, would this illegal cannabis cultivation be so prevalent or even exist at all?



The remnants of an illegal cannabis cultivation operation in the redwoods of Shasta–Trinity National Forest in Northern California
SOURCE: The Nature Explorers '*Homo sapiens Depredations of Series 3, 4, and 5 Expeditions Raw Footage*'
<https://www.youtube.com/watch?v=tnK5ETUofAI>

Waste Disposal, Landfills, and Recycling

The greatest mass recycling effort in history was most likely the one which was encouraged during World War II, and this shows that the masses will recycle when given incentive. Would the masses be motivated to recycle more if they knew the scale at which the recyclable waste is filling landfills and polluting the Earth? How can consumers be motivated to recycle food, metals, rags, and other things while also discouraging all forms of wasted resources during wartime, in order to create destruction, but not be equally motivated to during times of peace in order to save the Earth from destruction?



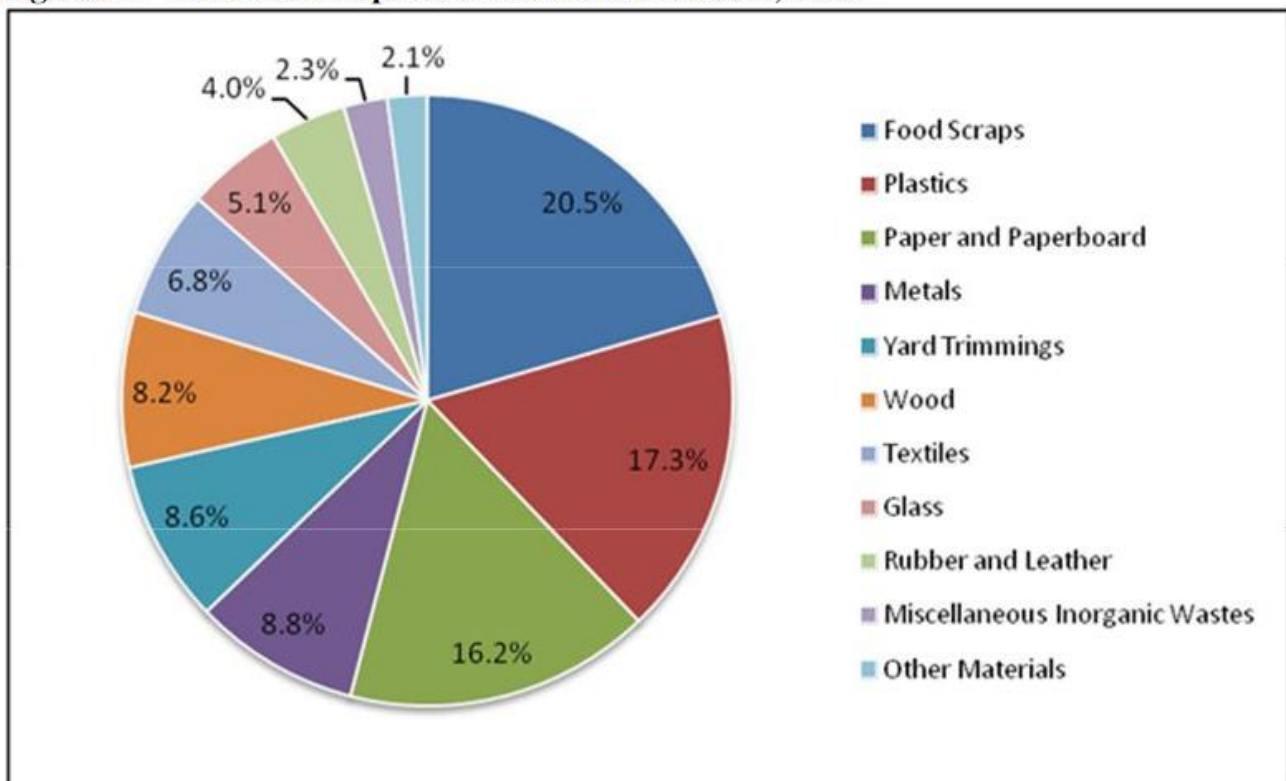
SOURCE: Wikimedia Commons - Some of the World War II recycling posters or the era.

Garbage has become accepted by most as just something that can be ignored and lived with, and garbage has become accepted and is ignored by most of society. If one looks at any area of Earth and the trash which now pollutes it and does not feel emotional, why would they ever resolve the issue by simply picking up the garbage

and practicing better garbage management habits? Today too many *Homo sapiens* have the mentality that so long as waste is 'out of sight, out of mind' it is gone, but this is far from the reality when it comes to waste and waste disposal. The reality is there is far more waste generated than most ever see or deal with, as it is conveniently taken away every week in a garbage truck never to be seen again. Consumption today is based on a 'throwaway, buy a new one' business model which is good for business, but horrible for the environment. Many products are now marketed as 'disposable' and are designed specifically for onetime use. (e.g. disposable cameras, non-rechargeable batteries, plastic diapers, disposable razors, etc.) There are also thousands of frivolous products sold solely to generate profits, and it creates far more waste than is necessary at all levels, from manufacturing to the consumer, while also using valuable energy, labor, and material resources to create a black hole of consumption.

Waste is generated by consumers, agriculture, construction and demolition, industries, businesses, municipalities, and other anthropogenic activities. Worldwide, an estimated 7,000,000,000 to 10,000,000,000 tonnes of urban waste is generated, which included municipal solid waste, commercial and industrial waste, and construction and demolition waste. (507) Between 1960 to 2014, the United States generated more than 2,197,700,000 tons of municipal solid waste (MSW), and the amount of waste has increased 193%, from about 88,000,000 tons generated in 1960 to about 258,000,000 tons generated in 2014. Of the municipal solid waste generated in 2014, more than 89,000,000 tons or 34% was recycled and composted, while 33,000,000 tons or 13% was combusted with energy recovery, and the remaining 136,000,000 tons or 53% was landfilled. In addition to the municipal solid waste generated, there was another 534,000,000 tons of construction and demolition debris generated in 2014, which includes steel products, wood products, drywall and plaster, brick, clay tile, asphalt shingles, concrete, and asphalt concrete. It should also be noted that there was only one timeframe between 1960 to 2014 when municipal solid waste decreased, it was between 2005 and 2010 when it decreased from 253,700,000 to 251,100,000, and this was also around the same time as the 2007/2008 financial crisis. (454)

Figure 2-1 Material Composition of the MSW Stream, 2010³



SOURCE: United States Environmental Protection Agency - Municipal Solid Waste Landfills Economic Impact Analysis for the Proposed New Subpart to the New Source Performance Standards - June 2014 - <https://www3.epa.gov/ttnecas1/regdata/EIAs/LandfillsNSPSPProposalEIA.pdf>

The issue is not just the waste itself, but the toxic chemicals that go into making the products which are left to degrade in these once pristine ecosystems for hundreds or possibly even thousands of years, potentially making the soil uninhabitable for flora, while also being deadly to fauna which ingest this trash. Over the last 55 years, the type of waste being put into landfills has changed from being mostly natural to more synthetic, while much waste which could rejuvenate the soils of Earth, like food scraps, wood, and yard trimmings, are left to rot in a landfill and create toxic methane gas. In 1988, there were 7,900 active MSW landfills in the United States, in 2009 there were 1,900, and while the number of landfills has declined dramatically, the average landfill size has increased. (490) Landfills are now so massive in size and hold such quantities of waste that they now support communities of scavengers living within the landfill. Worldwide there are perhaps hundreds of thousands of *Homo sapiens* which live within these landfills scavenging and recycling anything useful or valuable. Landfills are now so stacked with waste that garbageslides have occurred killing scavengers. The Payatas landfill in the Philippines is home to an estimated 80,000 scavengers, in 1998 a garbageslide there killed more than 200 scavengers, and another garbageslide in 2000 killed another 200 scavengers. (296) In March 2017, 115 scavengers in Ethiopia were killed after a garbageslide buried them alive, (297) and a month later at a landfill in Sri Lanka, 29 more scavengers died and 100 more were feared dead from yet another garbageslide. (298)

Table 2-2 Materials Discarded^a In the MSW Stream, 1960 to 2010 (in thousands of tons)⁴

Wastes	1960	1970	1980	1990	2000	2005	2010
Paper and Paperboard	24,916	37,540	43,420	52,500	50,180	42,880	26,740
Glass	6,620	12,580	14,380	10,470	9,890	9,950	8,400
Metals	10,770	13,350	14,290	12,580	12,340	13,400	14,540
Plastics	390	2,900	6,810	16,760	24,050	27,470	28,490
Rubber and Leather	1,510	2,720	4,070	5,420	5,850	6,200	6,610
Textiles	1,710	1,980	2,370	5,150	8,160	9,670	11,150
Wood	3,030	3,720	7,010	12,080	12,200	12,960	13,580
Other Materials ^b	70	470	2,020	2,510	3,020	3,080	3,380
Food Scraps	12,200	12,800	13,000	23,860	29,130	31,300	33,790
Yard Trimmings	20,000	23,200	27,500	30,800	14,760	12,210	14,200
Miscellaneous Inorganic Wastes	1,300	1,780	2,250	2,900	3,500	3,690	3,840
Total MSW Discarded	82,516	113,040	137,120	175,030	173,080	172,810	164,720

^a Discards after materials and compost recovery. In this table, discards include combustion with energy recovery.

Does not include construction and demolition debris, industrial process wastes, or certain other wastes.

^b Includes electrolytes in batteries and fluff pulp, feces, and urine in disposable diapers.

Details may not add to totals due to rounding.

SOURCE: United States Environmental Protection Agency - Municipal Solid Waste Landfills Economic Impact Analysis for the Proposed New Subpart to the New Source Performance Standards - June 2014 -

<https://www3.epa.gov/ttnecas1/regdata/EIAs/LandfillsNSPSPProposalEIA.pdf>

Many have never heard of the Mobro 4,000, aka Gar-berge, the ship from 1987 that hauled a load of trash from New York City to Belize and then ultimately ended up back in New York City, as no landfill would take the unwanted load of garbage. But this story is still very relevant today, as waste is now a billion-dollar business

based around profits and not solely on waste management, and as a result, it is treated as such with access often being limited to only those who can afford it. Recycling and even proper waste disposal is sometimes not done because of individuals and businesses preventing others from using their recycling or trash services. The dumpsters are often locked or inaccessible to the public which creates a waste dilemma. This restriction to waste disposal access contributes to some dumping trash on the side of a road or in a remote ecosystem. Could not businesses and individuals simply share their waste disposal services to help make the Earth cleaner? Is this control over waste disposal access a symbol of a society that wants to live on a clean Earth, or one that puts profits ahead of the environment? If waste disposal is based on profits and thus limits access, will it ever truly be a tool for all *Homo sapiens* to utilize in keeping Earth pristine?

Some say the solution is to incinerate *Homo sapiens* waste and utilize the waste as a power source, but this would only put heavy metals into Earth's atmosphere and create toxic ash which would need further disposal. These toxic chemicals in the atmosphere also have the potential to create acid rain and possibly contaminate the soil and water. One might think the apparent solution is to not use inorganic chemicals when creating anything, but more especially for consumer related products and instead use natural organic biodegradable alternatives. Attempting to fix one problem with another problem is not the solution to the waste issue, especially when consumption and biodegradability of the products are the issue which need to be addressed. If consumers were charged by the pound for garbage pickup instead of a monthly flat rate, is there any doubt that they would produce far less waste? Would they perhaps not demand less packaging from companies and buy more in bulk using their own containers? Would consumers not have more of an incentive to recycle at a home level as well? (e.g. reusing a bag that new food was in to store some left-over food in, versus using a new plastic bag and discarding the perfectly usable bag the new food came in)

Many consumer products were on the market for 50 or more years before they were ever even considered for recycling. How many millions of televisions, radios, and other consumer products are still rotting away in a landfill from the 1950's, 1960's, 1970's, 1980's, and 1990's? In 2000, only 10% of selected consumer electronics (ranging from TVs, computers and cell phones to fax machines) were recycled, by 2014 this number increased to nearly 42% percent. Other products which now have high recycling rates are, lead-acid batteries 99%, corrugated boxes 90%, steel cans 71%, newspapers/mechanical papers 68%, yard trimmings 61%, major appliances 58%, aluminum cans 55%, mixed paper 44%, and tires 40%. (454) China imports vast amounts of recyclable waste from the United States and it was a vital part in propelling its manufacturing boom. But by the end of 2017, China will forbid the importing of 24 types of solid waste for recycling, because they were finding large amounts of dirty waste and even hazardous waste mixed in with the solid waste which was seriously polluting China's environment. (624) As of 2017, only a small fraction of the population of Earth recycles or even has the ability to recycle except on an individual level, and it is done more out of necessity and lack of choice, and not for the conservation of Earth. If consumers were less indulgent and not encouraged through advertising to spend money on senseless things, would less waste be generated? If consumers were educated more about recycling and laws were enacted to ensure more recycling, would recycling rates increase?

Recycling is only as good as the product being recycled and if everyone recycles. If the product being recycled is made from more natural organic fauna material, (e.g. starch, sugar, oils, etc.) versus petroleum or chemical based from something synthetically created in a lab, it would be far simpler to recycle, and if the trash ever does reach the natural world it would be biodegradable and have little to no impact. Although glass takes many years to biodegrade, it does not leach toxic chemicals into the environment as it degrades like synthetically created toxic plastic. And glass, like some other natural inorganic materials, is far more natural when it is made using primarily silica and can be recycled again and again because it does not degrade very easily with normal use. By some estimates it takes 1,000,000 years for glass to decompose naturally, and if used properly and recycled it can potentially be one of the most long lasting eco-friendly products ever created. More and more recycling is being done now than in the past, and more products have the capability of being recycled, but if the product being recycled is toxic and not natural and cannot be recycled 100%, then recycling does very little to address the waste and pollution issues, it only perpetuates an endless cycle of toxicity. Products made from synthetic plastics are by far the most difficult to recycle, as there are so many diverse types, and most cannot be mixed or recycled together, some types cannot be recycled at all. Many products, because of design, are also unable to be recycled,

there is no company that recycles them, and the manufacturer of the products has no system in place to facilitate recycling, or does not engage in recycling because it would be less troublesome to make new ones. Some products are made using recycled plastic, which leads many to believe the solution is to recycle toxic plastic indefinitely, but unfortunately this is not possible. This leads to a false perception of recycling toxic plastic, in that so long as all the plastic is continuously recycled everything is fine. This misconception does not factor in that synthetically created plastics cannot be 100% recycled into other plastic products, nor does it consider how microscopic pieces flake off and pollute the environment. Synthetically created plastic must always be replenished with new chemicals to create virgin polymers, hence it is an ever-growing cycle of toxic chemical pollution. Recycling plastic by reusing it or repurposing it for another use, is also not the solution. (e.g. reusing a plastic bottle again and again, versus replacing the plastic bottle with an all-natural aluminum one, or repurposing the plastic bottle as a container for a plant allowing the plastic to slowly deteriorate from being exposed to natural elements, and ultimately contaminating the Earth) Recycling toxic non-biodegradable plastic in any form is never the solution, the only permanent solution is to change the type of plastic being consumed, while also encouraging less consumption. The only type of plastic which should be used is bioplastic made from 100% natural materials which are 100% biodegradable, and then it can truly be recycled, reused, and repurposed with far less impact to Earth. If new methods and uses for the already abundant natural resources like: sand, stone, soil, flora, etc. are the focal point of future research, this will not only make bioplastics more durable, but all products will 100% natural and biodegradable as well.

While the vast majority of automobile batteries are now recycled because of a refundable deposit, there are very few recycling programs for small consumer batteries, (e.g. AA, AAA, D, C, etc.) and millions are discarded into the trash each year only to end up in a landfill. In addition, there are thousands of product specific batteries which are also discarded and not recycled. How many billions of consumer batteries have been made and are now in a landfill? How many billions of batteries have been made since mass production began in the 1950's? Why is there even an option of disposable batteries, why not only manufacture rechargeable ones? Why aren't all portable power consuming products rechargeable? When this technology first became available why weren't rechargeable batteries made a requirement by law for all product manufacturers? Why isn't the disposal and recycling of batteries more regulated with laws and enforced with product tracking? If all batteries had a refundable deposit, would there be more effort to recycle them?

In 2015, United States companies created 125,069,000,000 aluminum containers for food, beverages, packaging, aerosols, and other uses. (363) For some products, like ones made from glass or metals, it is more beneficial to recycle than to extract and manufacture from raw materials, and there is most likely enough of some already in circulation to fulfill the demand where bioplastics cannot. Recycling of aluminum utilizes as little as 5% of the energy, while also only emitting 5% of the greenhouse gases as traditional aluminum production from raw ore. In 2009, close to 56,000,000 tonnes of aluminum were produced worldwide, 18,000,000 tonnes was recycled from scrap. Based on this figure, the worldwide recycling rate of aluminum is 32%. (365) Why isn't more attention given to aluminum recycling as it utilizes far less energy and emits far less greenhouse gas? Many parts of the world have no recycling programs in place, or consumers do not feel an obligation or need to recycle, and the recyclable metal and glass is discarded into a landfill. It should also be noted that many of the other minerals listed previously in the Chapter II, '2015 Global Mineral Commodity Production Statistics' table have very miniscule recycling rates, especially when compared with how much is being extracted each year.

A new emerging environmental waste issue is at the microscopic level through nanopollution generated by nanotechnology. These potentially toxic nanoparticles can potentially bioaccumulate in living organisms and possibly have a negative impact on the health of various flora and fauna species. Nanotechnology has been applied as an antibacterial agent for water treatment, food packaging, and on food crops as a pesticide. They are used in medical applications, clothing, paints and coatings, cosmetics, as a fuel additive, to manufacture electronics, and for many other industries, with more than 1,000 nanotechnology-based products in today's market. Studies have shown that plants can absorb, translocate, and accumulate nanoparticles, and thus they have the potential to be transferred through food consumption and potentially cause nanotoxicity. (555) Should a new technology be used so widely with so little study having been done on the environmental impacts of this technology?

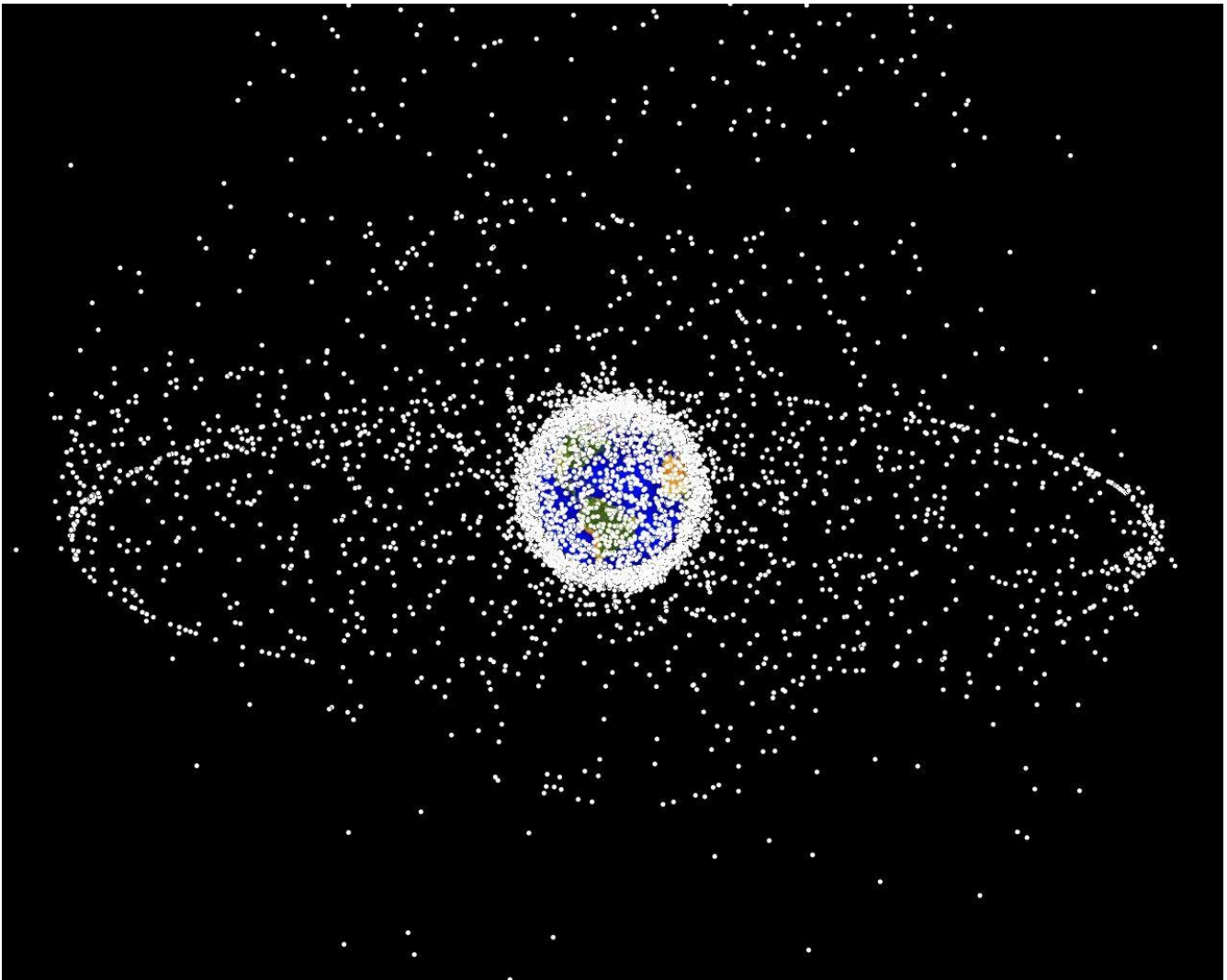
Many companies print a recycle logo on their products or packaging, but this does little more than allow a company to place the blame on the consumer with the excuse of, '*We told them it could be recycled, so it's out of our hands now, and not our fault.*' Some states also charge a small fee usually a few cents and it can be redeemed if the product is recycled, this is nothing more than a way to make money off recycling, and at best allows poverty-stricken individuals to generate income. If *Homo sapiens* are made aware of the necessity to recycle, then perhaps they would recycle more, or if the companies offered more recycling options of their products like a few manufacturers currently do, this would also help. But to place the blame and the responsibility solely on the consumer is unfair, especially when so many consumers are illiterate recyclers, and often simply discard recyclable items into the trash. The consumer must be educated and feel the need to recycle because it is the positive choice for the environment. The manufacturers have the full responsibility to facilitate the recycling of their products, while also making their products out of materials which are 100% recyclable and bio-degradable.

Too often, trash is ignored and passed by when *Homo sapiens* are walking, with the mentality of someone else will pick it up or I didn't do it so it's not my responsibility. Young and old alike must be educated to dispose of waste properly, and to clean up all forms of litter when it occurs and is encountered, or the problem of litter will only continue. Would misdemeanor crimes like litter be eliminated if the current surveillance system was used to also police for these crimes, and used to identify the minority of individuals who are doing the crimes, ultimately sending them a ticket similar to photo-enforced traffic lights? Very few communities have local laws requiring recycling, why is this not a nationwide federal law? All 50 states have some sort of litter laws, so why not a law requiring the recycling of this same litter? Should there not be a law to require the recycling of all consumer products, instead of encouraging it through labels and ad campaigns which are often ignored by many? As recycling is an environmental issue affecting everyone on Earth, shouldn't recycling be a law and not a choice? Most products and especially their packaging is not even designed to be recycled, why is this not required by environmental laws?

Space Garbage

Entertainment is full of fictional tales in which parasitic aliens invade Earth from outer space and exploit the planet, or to just simply conquer Earth, but *Homo sapiens* are in fact the ones that have become the parasitic invaders of Earth in their attempts to conquer and exploit it. If an alien race has visited the Earth in their UFO, they did it unnoticed and without depredating, colonizing, or even interacting with any of the inhabitants. Many speculate that aliens would never even visit a planet like Earth, being that *Homo sapiens* still act so barbaric and primitive in many ways, especially concerning moral and social issues. If an alien were to visit Earth from space, what would be the first thing they would encounter when arriving? The answer is space garbage, as *Homo sapiens* have even polluted outer space. In 2017, the European Space Agency (ESA) estimated there were 29,000 pieces of debris larger than 10 cm, 370,000 pieces of debris larger than 1 cm, and 170,000,000 pieces of debris larger than 1 mm orbiting Earth. (232) Could all of this space garbage eventually result in a Kessler syndrome?

Ever since the first space probe Sputnik 1 was launched in 1957, there have been more than 200 space probes which have been launched and left Earth's orbit to never return, having either landed or crash landed into another planet or moon, or they are still drifting in outer space, some of them were intentionally crashed at the end of their mission. Some of these probes now pollute other planets and moons with toxic unnatural chemicals created on Earth, all of which have never even been visited by *Homo sapiens*, except the Earth's moon, and yet these once pristine planets and moons are now polluted with *Homo sapiens* waste, all because of poor mission planning which never accounted for the waste that would be left behind. Voyager 1, which is currently in the interstellar medium, will most likely at some point be the first of *Homo sapiens* garbage to pollute an exoplanet or exomoon when it crashes in the distant future. In 2018, Elon Musk's perfectly functioning Tesla Roadster was launched into space unnecessarily, joining other space garbage in heliocentric orbit.



SOURCE: NASA Objects orbiting Earth currently being tracked, 95% of which are orbital debris and not functional satellites. NOTE: Objects are not to scaled to Earth. <https://orbitaldebris.jsc.nasa.gov/photo-gallery.html>

Ocean Garbage Patches and Beach Trash

Since 1972, there have been noticeable ocean garbage patches, and they have only increased in size. There are 5 major ocean gyres, thus there are 5 major ocean garbage patches, the 3 most prominent being the North Atlantic Garbage Patch, Great Pacific Garbage Patch, and the Indian Ocean Garbage Patch. The waste debris field constitutes an elevated level of pelagic plastics, chemical sludge, and other synthetic waste debris mainly consisting of microscopic particles that are invisible to the naked eye, with most of the waste debris particles suspended beneath the surface of the ocean. A scientific study in 2014, estimated there are at least 5,250,000,000,000 plastic particles weighing 268,940 tons floating in the oceans of Earth. (244) In another 2017 study, it was estimated that there were 300,000,000,000 pieces of plastic floating in the ice-free waters of the Arctic Ocean. (314) This anthropogenic debris floating in the oceans also allows for invasive species to hitchhike on the moving trash and colonize other parts of the planet which were formally unreachable. Most recently, scientist have discovered another even more concentrated and frozen one, the Arctic Garbage Patch, and it has far more debris. Arctic surveys found microplastics were present ranging from 38 to 234 particles per cubic meter of ice, compared with the North Pacific Subtropical Gyre which has between 0.12 particles per cubic meter, or Ireland with 0.34 particles per cubic meter. With millions of square kilometers of ice, there are trillions of pieces of nylon, rayon, polyester, acrylic, polypropylene, polyethylene, polyamide, and other types of plastic frozen in the Arctic ice waiting to be released, as global warming continues to rapidly melt the Arctic ice. (389)

The 30th annual International Coastal Cleanup in 2016, comprised 791,336 volunteers who collected 13,806,887 pieces of garbage weighing 18,062,911 pounds along 25,188.6 miles of shoreline worldwide. Amongst the garbage collected, were 2,127,565 cigarette butts, 1,024,470 plastic beverage bottles, 888,589 food wrappers, 861,340 plastic bottle caps, 439,571 straws and stirrers, 424,934 other plastic bags, 402,375 glass beverage bottles, 402,122 plastic grocery bags, 381,669 metal bottle caps, and 351,585 plastic lids. In addition, there were 1,332,799 tiny plastic pieces, 950,293 tiny foam pieces, and 594,349 tiny glass pieces measuring less than 2.5 centimeters. (544) The 2017 Sky News Special Report: '*A Plastic Tide*' shows the effects plastic waste is having along shorelines in many parts of the world.

What has been described as the worst level of plastic pollution in the world, is not in a populated area of Earth like one might think, but on an uninhabited island in the South Pacific. There are an estimated 37,700,000 pieces of plastic on the beaches of the uninhabited Henderson Island which was carried there by ocean currents. (315) How many thousands of similar uninhabited islands throughout the world have similar beaches which are riddled with millions of pieces of plastic and other garbage? How many more trillions of pieces of plastic are in the lakes, ponds, rivers, streams, creeks, and other waterways of Earth? How many millions of turtles, fish, birds, dolphins, and other marine fauna perish every year as result of this plastic? Could not the Naval forces of the United States, France, United Kingdom, China, and Russia with their vast technological resources and manpower help to clean up the oceans and other aquatic areas of Earth?

Lakes, Rivers, Wetlands, and Oceans

During 1999 and 2000, the USGS collected and analyzed water samples from 139 streams in 30 states, and found one or more foreign chemicals in 80% of the streams. They noted,

"The most frequently detected chemicals (found in more than half of the streams) were coprostanol (fecal steroid), cholesterol (plant and animal steroid), N-N-diethyltoluamide (insect repellent), caffeine (stimulant), triclosan (antimicrobial disinfectant), tri (2-chloroethyl) phosphate (fire retardant), and 4-nonylphenol (nonionic detergent metabolite). Steroids, nonprescription drugs, and insect repellent were the chemical groups most frequently detected. Detergent metabolites, steroids, and plasticizers generally were measured at the highest concentrations." (203)

When power plants, petroleum refineries, pulp and paper mills, chemical plants, steel mills, smelters, and other industrial activities use water as a coolant, it can result in thermal pollution. Other thermal pollution sources are from reservoirs releasing deep cold water, and from urban runoff when rain comes into contact with the hot pavement of roads and parking lots, which then drains into rivers and streams. This drastic and sudden change, either increasing or decreasing water temperature, can cause thermal shock killing fish and other marine flora and fauna organisms which have adapted to specific water temperatures.

Many cities around the world do not have adequate infrastructure to handle sewage, and as a result the sewage often overflows during storms allowing billions of gallons of untreated sewage to flow into rivers, and ultimately into the oceans. The EPA estimates there are at least 23,000 to 75,000 sanitary sewer overflows in the United States each year caused from blockages, line breaks, sewer defects, power failures, improper sewer design, and vandalism that allow stormwater and groundwater to overload the system. (534) Because of treatment centers being overwhelmed with rainwater in New York, an estimated 20,000,000,000 gallons of untreated sewage flows into city waterways. To comply with health regulations, city officials are planning to dump chlorine into the sewer pipes which lead directly to the waterways. (272) Would it not be more logical to build treatment facilities that can handle larger quantities of waste water instead of adding toxic chemicals in an attempt to mitigate the problem? Al Gore wrote,

"However, the danger we face as a result of improper waste hauling is nothing compared to what happens in most older cities in America every time it rains heavily: huge quantities of raw untreated sewage are dumped directly into the nearest river, creek, or lake. Since the so-called storm water sewers in these cities were built to connect to the sewer system (before the combined pipes reach the processing plant), the total volume of water during a hard rain is such that the processing plant would be overwhelmed if it didn't simply open the gates, forget about treating the raw sewage, and just dump it directly into the nearest large body of water. This practice is being allowed to continue indefinitely because local officials throughout the country have convinced Congress that the cost of separating the sewers that carry human waste from the sewers that carry rainwater would be greater than the cost of continuing to poison the rivers and oceans." (273)

The Cuyahoga River which flows into Lake Erie has been so toxic and polluted in the past with flammable industrial chemicals that it caught fire 13 times between 1868 and 1969. (205) In that same region the Chicago River, Buffalo River, and Rouge River have also caught fire multiple times in the past. (206) The Bellandur Lake in India is so polluted with chemicals that it too has caught fire several times over the years, most recently in January 2018. (682) In early September 2016, the Daldykan River turned from blue green to blood red, and the cause was chemical waste runoff from a metallurgical plant which produces nickel and palladium. Locals stated that this was not the first time they had seen the river turn red, but because of social media this time the world witnessed it. (151) Industrial and municipal waste, fertilizer and pesticide runoff, raw sewage, religious ceremonies involving the dipping of dead bodies, spreading cremated remains or dumping the dead body directly into the river, and floating religious offerings down the river, have all led to the Ganges being one of the most polluted river in the world. The Mississippi River in the United States, Marilao River in the Philippines, Yellow River in China, Jordan River in Israel, Buriganga River in Bangladesh, Citarum River in Indonesia, Sarno River in Italy, Yamuna River in India, and Matanza-Riachuelo River in Argentina are all also heavily polluted from similar anthropogenic activities. In addition, thousands of smaller streams and creeks throughout the world have also been polluted or have been somehow negatively impacted by anthropogenic activities. For more than 50 years the Chicago River has been dyed green in observance of St. Patrick's Day. Originally a toxic fluorescein dye was used until the United States Environmental Protection Agency stopped it. Now the parade committee uses a supposedly safer dye which only they know the exact formula of, but they insist it has been tested and is safe for the environment. When the Chicago Cubs won the World Series in 2016, the river was dyed blue.

An often-overlooked aspect of tropical cyclones are the toxic floodwaters which inevitably occur in the days after the storm makes landfall. These floodwaters usually contain a variety of municipal waste, industrial waste, fertilizers, pesticides, sewage, bacteria, viruses, and other toxic substances. All this toxic water flows down rivers and ultimately into the oceans polluting the environment along the way killing florae and faunae which inhabit the ecosystems.



SOURCE: NASA - On August 31, 2017, the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite captured this image of the Texas coast and the Houston metropolitan area. Less than a week after Hurricane Harvey had passed, the toxic flood water was visible pouring into the Gulf of Mexico from rivers and bays.
<https://earthobservatory.nasa.gov/NaturalHazards/view.php?id=90866>

In the 1600s, when colonist first arrived in what is now the United States of America, there were an estimated

220,000,000 acres of wetlands in the lower 48 states, by the mid-1980s only 103,300,000 acres of wetlands remained. (361) Since 1900, the world has lost an estimated 50% of its wetlands. (360) Between 1842 and 1969, madmen motivated by politics and money attempted to drain the Florida Everglades and convert the land into farmland and cities ultimately failing, but destroying huge expanses of wetlands in the process. In the Republic of Ireland only 28% of the blanket peatland remains relatively intact because of hand cutting over 400 years, mechanized turf extraction, afforestation programs, agriculture, and land reclamation. (716)

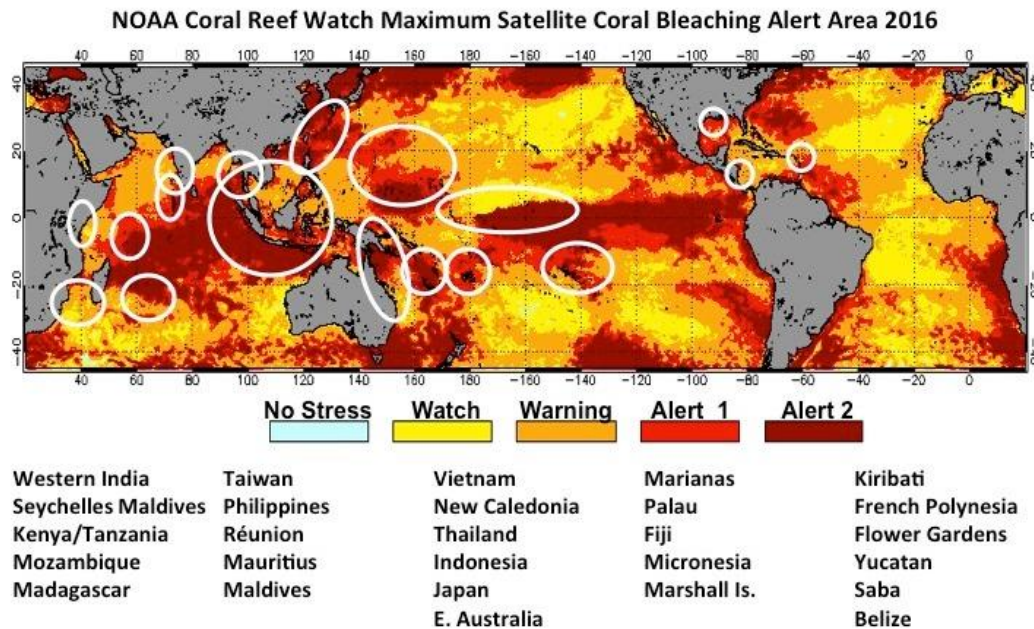
Around 200 years ago, 100% of the Earth's water was pure and uncontaminated to the point that nature could filter it completely. Today what percentage is now contaminated in some form be it chlorinated swimming pools, toxic industrial waste, toxic municipal wastewater, etc.? The available free water in cities is practically non-existent, streams have been covered with concrete while rivers are so polluted as to be unusable, and laws usually prevent either accessing or using most free flowing water. At one point all water flowed freely on Earth and was accessible to all, but today most all water is now privately owned and controlled for profits, either being bottled and sold by a commercial company or held by municipalities and sold to residents? How many millions of gallons of fresh water is locked up commercially in the form of bottled water, sodas, soaps, detergents, cleansers, and other liquid-based consumer products? How many millions of gallons of fresh water are being used in aquariums, car radiators, livestock operations, commercial activities, swimming pools, fountains, and other water-based things? Sam Bozzo's 2008 documentary *'Blue Gold: World Water Wars'* details the commercialization of Earth's freshwater resources.

Coral Reefs

Coral reef ecosystems support more than 800 hard coral species and more than 4,000 species of fish, but these coral reef ecosystems, often referred to as the *'Rainforests of the Sea'*, are being destroyed. Ocean acidification, global warming, pollution, tourism, overfishing, and other anthropogenic related activities are contributing to a worldwide mass die off within coral reef ecosystems. Warming oceans are causing more frequent mass bleaching events worldwide, and while bleaching is not always fatal to corals, it can reduce growth, calcification, and rejuvenation capabilities. Bleached corals have the potential to recover if given time and an ideal ocean temperature, but a 2018 review of 100 reefs globally between 1980 and 2016, found that the average interval between coral bleaching events is less than half of what it was in 1980. (692) Since 1979, there have been 10 major coral bleaching episodes which have affected coral reef ecosystems around the world.

Coral disease is also more widespread since 1990 causing further coral losses worldwide. Some faunae species which inhabit coral reef areas have also become less common or have disappeared entirely since the 1960s. In 2008, it was estimated that 19% of the global coral reef area has been lost. (570) The massive bleaching event in 2005, killed more than half of the coral reefs in the United States and the Caribbean. The mass bleaching events between 2014 and 2016 had major impacts on coral reef ecosystems around the globe, and eventually led to some large portions of coral dying. The longest ever bleaching event ever recorded since record keeping began occurred in 2016. The mass coral bleaching event that happened between 1997 and 1998 resulted in an estimated 16% of the world's reef corals dying, could even warmer oceans create future bleaching events which cause coral losses to be as high as 50% or even higher? Could future bleaching events reach such extremes that coral cannot rejuvenate quickly enough, and the majority of corals goes extinct? Could some corals adapt to warming oceans and survive global warming?

In 2012, the Australian Institute of Marine Science stated that Australia's Great Barrier Reef cover has fallen from 28% to 13.8% since 1985, with two-thirds of the decline happening since 1998. The causes were: storm damage 48%, coral bleaching caused by warmer ocean water which in turn lowers pH levels and results in ocean acidification 10%, and explosion of crown-of-thorns starfish caused by agricultural nutrient runoff 42%. Crown-of-thorns starfish population fluctuations naturally occur every 50 to 80 years, but agricultural runoff has now made the average 15 years. (79) In addition, the giant triton fish which feeds on crown-of-thorns has been severely overfishing allowing the population to increase abnormally.



SOURCE: NOAA - NOAA Coral Reef Watch Maximum Bleaching Alert Area map for January-December 2016. Severe coral bleaching was reported in all areas circled in white on map and listed below the map.
https://coralreefwatch.noaa.gov/satellite/analyses_guidance/global_coral_bleaching_2014-17_status.php

Fish

Some wild fish species have seen their populations collapse or are in danger of collapsing due to warming oceans, ocean acidification, habitat loss, overfishing, plastic waste, eutrophication, and other pollution from anthropogenic activities. In 2015, there were 92,600,000 tonnes of marine faunae harvested from the oceans of the world, according to fisheries data gathered by the Food and Agriculture Organization of the United Nations. (279) But based on catch reconstructions done by Daniel Pauly and Dirk Zeller on the reported catches between 1950 and 2010, the actual total could be 53% higher. (280) By-catch or the portion of the fish caught while fishing that are not the target species is a major issue. Millions of these fish are killed purposely and not released, as they are seen as a nuisance and hindrance from catching the target species, an erroneous mentality that with less by-catch fish more target fish will be caught. Blast fishing and cyanide fishing are two other methods which are widely used in Southeast Asia and in some other parts of the world, both practices potentially hurt non-targeted species and also coral reefs. Cyanide fishing is especially used to stun fish and capture them to supply fish for aquaria. An estimated 1,000,000 kilograms of cyanide have been used for fishing in the waters around the Philippines since the 1960's. (495) Declawing crabs is a common practice in the fishing industry with the intention that the crabs will regenerate the removed claws in about a year, unfortunately many of these crabs die within 24 hours after having their claws removed. In the United States, between 1995 and 2005, gulf coast fishers declawed 10,500,000 crabs and returned them to the water to regenerate their claws or to perhaps perish. (198) Declawing crabs also creates an imbalance in the ecosystem food chain, as crabs with no claws eat more fish meat and less mussels leading to greater mussel populations. As the oceans are so vast, there is also rampant illegal fishing, but perhaps the new Global Fishing Watch program will allow more transparency when it comes to ocean fishing.

From a lack of proper management and conservation some ocean species of fish have also been severely overfished commercially like the Pacific bluefin tuna, Atlantic bluefin tuna, yellowtail flounder, blue king crab, swordfish, bigeye tuna, red snapper, Atlantic halibut, striped marlin, Atlantic cod, and other species. The NOAA Fisheries 2016 Report to Congress on the Status of U.S. Fisheries listed 38 (16%) out of 235 stocks with known status as being overfished, and 30 (9%) out of 316 stocks with known status were subject to overfishing. (593) A 2008 study led by the USGS highlighted 700 fresh water fish species either vulnerable (230 species), threatened (190 species), or endangered (280 species) and an additional 61 fish species presumed extinct. (309) A May 2014 release by NOAA Fisheries on the major threats and impacts to Pacific salmonoid stated,

“Salmonid species on the west coast of the United States have experienced dramatic declines in abundance during the past several decades as a result of human-induced and natural factors. There is no single factor solely responsible for this decline. Given the complexity of the salmon species life history and the ecosystem in which they reside, it is difficult to precisely quantify the relative contribution of any one factor to the decline of a given species. Rather, given the available data, it is only possible to highlight factors which have significantly affected the status of a particular species.

Water storage, withdrawal, conveyance, and diversions for agriculture, flood control, domestic, and hydropower purposes have greatly reduced or eliminated historically accessible habitat and/or resulted in direct entrainment mortality of juvenile salmonids. Modification of natural flow regimes have resulted in increased water temperatures, changes in fish community structures, depleted flows necessary for migration, spawning, rearing, flushing of sediments from spawning gravels, gravel recruitment and transport of large woody debris. Physical features of dams, such as turbines and sluiceways, have resulted in increased mortality of both adults and juvenile salmonids. Attempts to mitigate adverse impacts of these structures have to date met with limited success.

Natural resource use and extraction leading to habitat modification can have significant direct and indirect impacts to salmon populations. Land use activities associated with logging, road construction, urban development, mining, agriculture, and recreation have significantly altered fish habitat quantity and quality. Associated impacts of these activities include: alteration of streambanks and channel morphology; alteration of ambient stream water temperatures; degradation of water quality; reduction in available food supply; elimination of spawning and rearing habitat; fragmentation of available habitats; elimination of downstream recruitment of spawning gravels and large woody debris; removal of riparian vegetation resulting in increased stream bank erosion; and increased sedimentation input into spawning and rearing areas resulting in the loss of channel complexity, pool habitat, suitable gravel substrate, and large woody debris. Studies indicate that in most western states, about 80 to 90 percent of the historic riparian habitat has been eliminated. Further, it has been estimated that during the last 200 years, the lower 48 United States have lost approximately 53 percent of all wetlands. Washington and Oregon's wetlands have been estimated to have been diminished by one third, while it is estimated that California has experienced a 91 percent loss of its wetland habitat.

The degree of spatial and temporal connectivity between and within watersheds is an important consideration for maintaining aquatic riparian ecosystem functions. Loss of this connectivity and complexity, such as the loss of deep pool habitats, has contributed to the decline of salmon. In Washington, the number of large, deep pools in National Forest streams has decreased by as much as 58 percent due to sedimentation and loss of pool-forming structures such as boulders and large wood. Similarly, in Oregon, the abundance of large, deep pools on private coastal lands has decreased by as much as 80 percent.

Salmon have been, and continue to be, an important target species for recreational fisheries throughout their range. During periods of decreased habitat availability, the impacts of recreational fishing on native anadromous stocks may be heightened. Commercial fishing on unlisted, healthier stocks has caused adverse impacts to weaker stocks of salmon, and illegal high seas driftnet fishing in past years may have also been partially responsible for declines in salmon abundance. However, such fisheries cannot account for the total declines in salmon abundance in North America.

Introduction of non-native species and modification of habitat have resulted in increased predator populations and salmonid predation in numerous river and estuarine systems. Piscivorous birds such as terns and cormorants, and pinnipeds such as sea lions and harbor seals are examples of potential salmon predators. Marine predation is also of concern in areas of dwindling salmon run-size. In general, predation rates on salmon are considered by most investigators to be an insignificant contribution to the large declines observed in west coast populations. However, predation may significantly influence salmonid abundance in some local populations when other prey are absent and physical conditions, such as narrow river mouths or human-made barriers such as fishing locks, lead to the concentration of adult and juvenile salmonids.

Natural environmental conditions have served to exacerbate the problems associated with degraded and altered riverine and estuarine habitats. Recent floods and persistent drought conditions have reduced already limited spawning, rearing, and migration habitat. Furthermore, climatic shifts over a decadal time scale appear to have resulted in decreased ocean productivity which may exacerbate degraded freshwater habitat conditions to some degree. Environmental conditions such as these have gone largely unnoticed until recently, when salmonid populations have reached critical low levels.

In an attempt to mitigate for lost habitat and reduced fisheries, extensive hatchery programs have been implemented throughout the range of salmon on the west coast. While some of these programs have been successful in providing fishing opportunities, the impacts of these programs on wild stocks are not well understood. Competition, genetic introgression, and disease transmission resulting from hatchery introductions may significantly impact the production and survival of wild salmon. Commercial and recreational fisheries targeting stronger stocks supported by hatchery production may inadvertently result in adverse impacts to weaker, wild stocks. Furthermore, collection and utilization of wild fish for broodstock purposes may result in additional negative impacts to small or dwindling natural populations.” (582)

There are millions of fish tanks worldwide which imprison billions of aquatic organisms wasting valuable energy, water, and other resources. Millions of additional aquatic organisms undoubtedly die each year while

being harvested and transported to aquariums and pet stores. Several species have been released by pet owners into ecosystems becoming invasive species potentially decimating native flora and fauna. A 2012 study found that each year more than 2,000,000 homes and public aquariums throughout the world obtain millions of exotic marine organisms from coral reefs and associated habitats, with the majority of consumers being in the United States. This wildlife trade is based on over 150 species of stony corals, hundreds of species of non-coral invertebrates, and at least 1,472 reef fish species. (583) The USGS states,

"Most fishes available for sale in pet shops are exotic and are imported predominantly from Central and South America, Africa, and southeast Asia. Each year, over 2000 species, representing nearly 150 million exotic freshwater and marine fishes, are imported into the United States for use in the aquarium trade. Fish culture in Florida also results in millions of exotic fish available for sale in the industry.

Unfortunately, a number of exotic fishes are released into the wild each year. Hobbyists may not be able to take their fish with them when they move, or they simply may lose interest in maintaining an aquarium. Fish may also be released if they outgrow the aquarium or if they appear to be in poor health. Whatever the reason, releasing exotic fish into local waters is not a good idea.

Currently, at least 185 different species of exotic fishes have been caught in open waters of the United States, and 75 of these are known to have established breeding populations. Over half of these introductions are due to the release or escape of aquarium fishes. Because many of these fishes are native to tropical regions of the world, their thermal requirements usually prevent them from surviving in temperate areas. In the U.S., therefore, most introduced fishes have become established in Florida, Texas, and the Southwest. Examples include a number of cichlid, such as the oscar, Jack Dempsey, jewelfish, convict cichlid, Midas cichlid, and spotted tilapia; and livebearers, such as swordtails, platies and mollies, and armored catfishes. The goldfish, a native of China, is one of the few examples of a temperate aquarium species that is established throughout the U.S." (584)

Sport fishing is practiced by millions around the world and is now a billion-dollar industry of mainly plastic fishing tackle, (e.g. fishing line, nets, hooks, floats, beads, spoons, lures, etc.) all of which is lost while fishing and ends up polluting marine ecosystems. Some recreational fishermen practice catch and release, but during this process the fish can suffer barotrauma, are injured, permanently scarred, stressed, suffer pain, and could possibly die as a result. Competitions are held annually to see who can catch the largest fish, while other recreational fishermen catch and taxidermy a variety of fish species to hang it on the wall rather than for consumption. Several species of fish have also been introduced into ecosystems to accommodate sport fishermen, and the practice of stocking lakes with fish for catching is also done.

Another issue is called ghost fishing, where fish of all sizes inadvertently get caught or trapped in lost fishing tackle or other anthropogenic debris which litters lakes, rivers, streams, and the ocean ultimately becoming injured or dying as a result. Between 2000 and early 2015, more than 230 whales were entangled in fishing gear off the United States Pacific coast, and some of these whales died as a result of their entanglements. (257) Whales have also been ingesting large amounts of ocean garbage. When whales and dolphins ingest ocean garbage they could potentially suffer physical damage to the digestive system, or the ocean garbage can give them a sensation of being full eventually lead to starvation. In 2016, several sperm whales on the coast of Germany were found with the remains of a 13-meter-long and 1.2-meter-wide protective net used in crab fishing, a 70-cm-long plastic cover from the engine compartment of a car, and the sharp-edged remains of a plasticizer. (375) In February 2018, a sperm whale washed up in Cabo de Palos, Spain and autopsy results concluded that it had died of peritonitis caused by the 64 pounds of plastic and other garbage lodged in its stomach. (115) In June 2018, a pilot whale died off Southern Thailand and the autopsy revealed around 80 plastic bags weighing more than 17 pounds inside its stomach. (116) How many thousands of whales, dolphins, and other aquatic species have died from ingesting plastic but went undocumented because they didn't wash ashore?

Freshwater fish populations are in peril due to anthropogenic activities, mainly from encroachment on habitat and the pollution of the freshwater itself. In the April 2010 issue of National Geographic Magazine, Douglas H. Chadwick stated that,

"...in North America, for instance, 39 percent of freshwater fish are imperiled, up from 20 percent only a few decades ago. Freshwater animals in general are disappearing at a rate four to six times as fast as animals on land or at sea. In the United States nearly half of the 573 animals on the threatened and endangered list are fresh water species.

In general, though, the endangered southeastern fish are of no economic importance. In some places that's precisely why they were eliminated. Tennessee's Abrams Creek, which winds for just 25 miles, mostly through Great Smoky Mountain National Park, used to hold nearly 70 species of native fish. (In contrast, the Columbia and Colorado river systems, which drain most of the American West, support only 54 species between them.) But Park officials decided in 1957 to poison the native fish and stock the stream with non-native trout for sportfishing. They didn't want all those little local "baitfish" competing with young trout for food. Before long, Abrams Creek had lost nearly half of its original fish species."

Another emerging concern are environmental xenobiotics, mainly pharmaceutical drugs, found in fish populations and other organisms caused from the wastewater of hospitals, pharmaceutical companies, and households which is generated during manufacturing, improper disposal of, and the excretion of the drugs through urine and feces. A 2002 study found more than 80 compounds, pharmaceuticals, and several drug metabolites in the aquatic environments of Austria, Brazil, Canada, Croatia, England, Germany, Greece, Italy, Spain, Switzerland, The Netherlands, and the United States. (308) A study conducted on the water in 2016 on 6 stream sites in Baltimore, Maryland found numerous pharmaceutical drugs and illicit drugs including amphetamines. (175) Another 2014 study conducted in the United Kingdom found that exposure to estrogenic effluents contained in wastewater discharge was causing widespread feminization in *Rutilus rutilus* fish populations. (410) The April 2010 issue of National Geographic Magazine reported that,

"The traditional for of water quality is waste from factories and farms, but now environmental regulators are eyeing a new pollution source: our medicine chests. Fish caught downstream from sewage treatment plants in five U.S. cities contained traces of pharmaceuticals and toiletries, Baylor University researchers found in a recent study.

The fish tested from Chicago's North Shore Channel contained:

2% Diltiazem - Antihypertensive (0.13 nanograms per gram of fish fillet tested)
46% Norfluoxetine - Antidepressant by-product (3.2 nanograms/grams)
20% Diphenhydramine - Antihistamine (1.4 nanograms/grams)
33% Carbamazepine - Antiseizure (2.3 nanograms/grams)
NOTE: PERCENTAGES EXCEED 100 BECAUSE OF ROUNDING"

Whaling, Dolphin Driving, Military Dolphins, and Sonar

50,482 whales were killed and reported to the International Whaling Commission (IWC) between 1985 and 2015. (192) Thousands of other whales were also perhaps killed and not reported, like was the case with an estimated 180,000 unreported whales killed by Russian whalers from 1948 to 1973. (193) Since whaling began 5,000 years ago, how many millions of these faunae have been killed and harvested for their oil and for consumption? Another concern to whales and dolphins are the high levels of PCBs which accumulate, European species being affected more so. (207)

In the Solomon Islands, the Faroe Islands, Peru, and Japan, dolphin pods are driven ashore to be captured and sold to aquariums or slaughtered for their meat, which contains highly toxic levels of mercury, cadmium, DDT, and PCBs. In Peru, dolphins have been killed by fisherman and used as shark bait, which are then killed for their fins to make shark fin soup. (195) One need only watch the 2009 documentary *'The Cove'* directed by Louie Psihoyos which shows the *'Killing Cove'* in Taiji, Wakayama in Japan to see this mass senseless slaughter of dolphins.

During World War II, the United States had two projects involving faunae delivering bombs, one involved bats carrying bombs and the other was a pigeon controlled guided bomb, both projects failed. However, since the 1960s the United States Navy has used a variety of marine faunae for mine hunting, force protection, object recover, attacking missions, and reconnaissance. Beluga bottlenose dolphins, common dolphins, Dall's porpoises, false killer whales, orca Pacific white-sided dolphins, pilot whales, Risso's dolphins, rough-toothed dolphins, California sea lions, common seal elephant seals, fur seals, grey seals, Steller sea lions, birds, and sharks have all been used or studied for use. The Russian Navy have also used marine faunae for similar operations, in 2000 Russia sold Iran kamikaze dolphins along with military trained walruses, sea lions, seals, and a white beluga whale. (194) Today whales and dolphins are also being threatened by technology and the Navy's use of sonar

which disrupts their echolocation and has been linked to multiple whales and dolphins beaching themselves.

Known Naval Sonar Incidents Affecting Marine Mammals		
Year and Location	Species and Number Affected	Related Naval Activity
1963 Gulf of Genoa, Italy	Cuvier's beaked whale (15) stranded	Naval maneuvers
1988 Canary Islands	Cuvier's beaked whale (12+) Gervais' beaked whale (1) stranded	FLOTA 88 exercise
1989 Canary Islands	Cuvier's beaked whale (15+), Gervais' beaked whale (3), Blainville's beaked whale (2) stranded	CANAREX 89 exercise
1991 Canary Islands	Cuvier's beaked whale (2) stranded	SINKEX 91 exercise
1996 Gulf of Kyparissia, Greece	Cuvier's beaked whale (12) stranded	NATO Shallow Water Acoustic Classification exercise
1998 Kauai, Hawaii	beaked whale (1), sperm whale (1) stranded	RIMPAC 98 exercise
1999 U.S. Virgin Islands and Puerto Rico	Cuvier's beaked whale (4) stranded	COMPTUEX exercise
2000 Bahamas	Cuvier's beaked whale (9), Blainville's beaked whale (3), beaked whale spp (2), Minke whale (2), Atlantic spotted dolphin (1) stranded	Naval MFA
2000 Madeira	Cuvier's beaked whale (3) stranded	NATO Linked Seas 2000 and MFA
2002 Canary Islands	Cuvier's beaked whale (9), Gervais' beaked whale (1), Blainville's beaked whale (1), beaked whale spp. (3) stranded	Neo Tapon 2002 exercise and MFA
2003 Haro Strait, Washington Harbor	porpoise (14), Dall's porpoise (1) Orca avoidance "stampede" U.S.S. Shoup transiting while using MFA (AN/SQS-53C) [32] 2004-07 Kauai, Hawaii Melon-headed whale (~200) avoidance "stampede"	RIMPAC 04 exercise with MFA
2004 Canary Islands	Cuvier's beaked whale (4) stranded	Majestic Eagle 04 exercise
2005 Marion Bay, Tasmania	Long-finned pilot whales (145) stranded	Two minesweepers using active sonar
2006 Almería Coast, Spain	Cuvier's beaked whale (4) stranded	HMS Kent using active MF sonar
2008-06 Cornwall, UK	Dolphins (26) stranded	Naval exercise but no ship sonar in use except HF hydrographic sonar on HMS Enterprise
SOURCE: Wikipedia (with some corrections, additions, and other edits)		

Shark Finning and other Ancient Pseudo Medicines

On average around 10 *Homo sapiens* are killed by sharks each year, in contrast to 38,000,000 sharks being killed each year by *Homo sapiens* for their fins to make shark fin soup or for use in traditional Chinese pseudo medicines. Shark fin soup is often consumed in Asia as a sign of wealth and social status, and each year millions of sharks are killed for their fins to make this delicacy or to be used as a pseudo medicine. From 1996 to 2000, an estimated 26,000,000 to 73,000,000 sharks were killed annually. (196) These sharks were caught, then their fins were brutally cut off, and finally the essentially paralyzed sharks were tossed overboard to sink to the bottom of the ocean and suffocate. In 2017, there were 25 species of shark which were either endangered or critically endangered, due in part from shark finning. One can watch the 2006 documentary film '*Sharkwater*' directed by Rob Stewart or see the 2011 special '*Gordon Ramsay: Shark Bait*' directed by Helen Simpson for a more detailed perspective on the industry.

Some countries have little to no laws protecting florae and faunae, and some governments turn a blind eye to all flora and fauna exploitation, no matter how unethical and so long as money is being made. Some traditional Asian medicines utilize a variety of flora and fauna species for pseudo cures which have no medicinal value whatsoever and are based on knowledge which is from old myths and superstitions. Each year, up to 20,000,000 sea horses are extracted from the oceans and used in traditional medicines resulting in some species now being endangered. (285) In 2015, there were an estimated 5,000 to 6,000 tigers on nearly 200 tiger farms in China being bred to make tiger bone wine, tiger-skin rugs, and taxidermized tigers, products mostly sought after by rich elites as a status symbol. (382) In China, more than 10,000 black bears have been kept in cages for life with open

wounds cut into their stomachs to extract bile from their gallbladders to make ancient pseudo medicinal potions which cure absolutely nothing. (284) Millions of sea turtle and other fauna eggs are consumed each year with the erroneous belief that the eggs are an aphrodisiac or possess another magical cure that can add longevity to the desperate and ignorant consumer's life. In China, there are more than 100 cockroach farms containing millions of cockroaches which are used in Asian pseudo medicines and cosmetics. (262) A variety of fauna parts are also used, like: the penis, horns, urine, feces, bones, and other parts from tigers, snakes, dogs, deer, turtles, and other fauna. Is there not a more renewable flora-based ingredient that could be used instead of using faunae? Why can consumers not see that these pseudo medicines do not work and are nothing more than a scam to make money? Would it not be more logical to trust science with proven medical procedures and medicines which have been shown to work for some of these medical conditions? Made primarily from cow bones, bone ash used in cupellation, machine shops, as a fertilizer, and to make bone china, a fact that few realize or simply overlook when purchasing these popular ceramics. Blood and bone meal which comes from cows and hogs that have been slaughtered for consumption is used as a fertilizer, livestock dietary supplement, and as a pest control.

Zoos

Many *Homo sapiens* have a quasi-connection with nature, their only contact with real nature is usually an entertainment related source be it extreme sport, television, or going to a zoo. One could gain far more knowledge watching a video of a species of fauna in its natural state, versus seeing a once mighty fauna humbled into submission through capture and permanent captivity. To keep faunae confined and trapped in a vivarium, which is actually a very poor representation of the vast ecosystem it should be a part of is cruel and unnatural, many faunae will not even procreate under captivity and if so rarely do and under extreme difficulty. What does this say about the practice? Even more barbaric are the hundreds of amateur zoos around the world which usually have more deplorable conditions, and even smaller and more confining cages. Zoos operate under a facade based on conservation, but they are really about profits through the exploitation of faunae. In 2017, angry zoo shareholders in China, who were upset because they were unable to receive returns on their investments, pushed a live donkey out of a truck into a tiger enclosure and it was subsequently devoured. (373) In 2017, there were more than 10,000 zoos globally (143) with 700,000,000 *Homo sapiens* visiting these zoos annually. (142) In addition, in the United States there are 2,400 licensed fauna exhibitors (143) and 181,000,000 *Homo sapiens* visited these fauna prisons each year also. That is more than the NFL, NBA, NHL, and MLB annual attendances combined, and illustrates the instinctive biophilia which all *Homo sapiens* naturally possess. (141) Do *Homo sapiens* long for nature so much that they will go so far as to witness these horrible places of confinement just to have some type of interaction with nature? Henry David Thoreau wrote,

"We are conscious of an animal in us, which awakens in proportion as our higher nature slumbers. It is reptile and sensual, and perhaps cannot be wholly expelled; like the worms which, even in life and health, occupy our bodies. Possibly we may withdraw from it, but never change its nature." (696)

On average the Copenhagen zoo culls 20 to 30 animals per year, and in February 2014 the Copenhagen zoo executed a giraffe despite that other zoos had offered to take the unwanted giraffe, the giraffe was dismembered and fed to lions all in full view of zoo patrons which included children. (146) A few weeks later the same zoo killed 4 healthy lions to make room for an older male lion. Spokesman David Williams-Mitchell of the European Association of Zoos and Aquaria told CNN that zoos governed by the body kill about 3,000 to 5,000 animals each year to manage zoo populations, a few hundred of these being larger animals. (147) In 2017, it was reported that the chronic food shortages in Venezuela had resulted in faunae being stolen from the Zulia Metropolitan Zoological Park for consumption. (513) As a result of the 2003 invasion of Iraq, the Baghdad Zoo faunae suffered a horrible fate. When conservationist Lawrence Anthony arrived just after the invasion, only 35 of 650 zoo inhabitants were still alive, the rest had either died in their cages of thirst and starvation or had been stolen by looters. (229) In 2017, a 49-year-old lowland gorilla at the Topeka Zoo underwent constipation surgery, only to die of ovarian cancer days after the surgery. (520) Why has the morbid practice of prolonging life in an attempt to avoid the inevitable death now been extended to include domesticated and even wild fauna?

There are currently more than 300 oceanariums or aquatic theme parks which feature marine faunae, in short, they are water zoos with many of the inhabitants being made to perform in shows doing tricks for food. A June

2015 article in National Geographic Magazine listed an estimated figure of 2,913 Dolphins in captivity at these water zoos. In addition to these oceanariums, there are more than 200 public aquariums which imprison millions of marine flora and fauna. Many of these marine fauna were captured in the wild and some are bred in captivity. A manatee was born and lived in a Florida aquarium for 69 years, until it was trapped by a hatch door and drowned in 2017. (434) In 2017, there were more than 50 orcas in captivity, these captive orcas have a much shorter lifespan than that of their wild counterparts, and most males and some females have a dorsal fin partially or fully collapsed. The documentary '*Blackfish*' by: Gabriela Cowperthwaite 2013, shows the reality of captive orcas in oceanariums like SeaWorld and Loro Parque.

Pets

Millions of *Homo sapiens* worldwide engage in anthropomorphism with a variety of pets, many of these same individuals exploit the pet as an object of affection, something to love and to be loved by. Isn't nature in its natural form enough? What is the point of a pet other than a pseudo form of companionship, to be a tyrant over a species, or to have a pseudo connection with nature? Anthropomorphizing animals could be interpreted as morally wrong no matter what aspect it is viewed from. And it is especially morbid when *Homo sapiens* acquire a pet simply to make a fashion statement or to be trendy, some even dress their pets in clothes. Owning a dog, cat, bird, snake, turtle, or other exotic rare flora or fauna species does not make the owner special or unique, the experience has nothing to do with love, it is nothing more than a relationship based on reliance and imprisonment, as the pet is dependent on food and trapped. Most of all, it does not bring the pet owner any closer to nature, it simply shows the reality of the owner, a delusional addicted petty tyrant which has no true understanding of nature nor any connection with it whatsoever. This delusional and addictive thought pattern towards the natural world is not only a danger to oneself, but more especially to the flora or fauna species. Some are also delusional in thinking that they can communicate with fauna and talk to them on some sort of spiritual level. *Homo sapiens* who feel they need to attempt to master, briefly own, and control flora and fauna species could be viewed as nothing more than someone with a morbid obsession for the unattainable. Like the cow, chicken, pig, etc., all dogs and cats which exist today have been selectively bred and are not found anywhere in nature, they have been engineered by *Homo sapiens* and are nothing more than a pseudo form of true nature.

To fulfill this demand for pets, there are thousands of pet stores which legally trade dogs, cats, fish, rabbits, reptiles, and other fauna. Dog and cats are sold in an open market which is a socially accepted legal billion-dollar animal trade, with some breeders charging upwards of \$1,500 or more for purebreds. Some of these pets are made to compete in various events, while others are nothing more than a fashion accessory. There are an estimated 78,000,000 dogs and 85,800,000 cats owned by families or individuals in the United State, with another 6,500,000 dogs and cats entering animal shelters and 1,500,000 of them being euthanized each year. (303) Why are millions of dogs and cats bred purposefully when so many are already available, so many in fact that 1,500,000 are euthanized each year?

There are many dogs, cats, and other pets which receive thousands of dollars' worth of medical treatments, and it is often better than many *Homo sapiens* around the world receive or even have access to. Many of these pet medical treatments do nothing more than waste money and resources attempting to prolong an inevitable death. There are more than 500,000 veterinarians throughout the world which perform a variety of services on pets from simple health evaluations to barbaric neutering and onychectomy operations. (519) In addition, there are thousands of other grooming operations and pet spas which specialize in pampering dogs and cats. Some pet owners spend vast sums of money on their pet in the form of food, toys, grooming, jewelry, clothes, pet-sitters, obedience school, and other senseless pet related things. Many pets in the United States and other western countries eat better quality food than many *Homo sapiens* around the world eat. *Homo sapiens* have even done the senseless and selfish act of leaving their pets a vast inheritance when they die. The German shepherd Gunther III inherited \$80,000,000 when his owner died, his offspring Gunther IV is worth \$375,000,000 as of 2017. Blackie the cat inherited \$13,000,000 in 1988, the same as Tommaso another cat which also inherited \$13,000,000 in 2011, and Gigoo, a chicken, inherited \$15,000,000 in 2001. (242) How much more wisely could this money have been spent helping less fortunate *Homo sapiens* with food, medicine, education, or other positive actions?

Dogs and cats are also vectors for disease harboring parasites such as fleas and ticks, and as a result many cat and dog owners purchase toxic collars, sprays, dust, and concentrated liquid applications which contain organophosphates. Older formulas contained even more toxins, between 2000 and 2006 chlorpyrifos, dichlorvos, phosmet, naled, diazinon, and malathion were all removed from the market. Exposure happens when *Homo sapiens* pet the cat or dog and come into direct contact with the toxin which is on the fur or skin of the animal, and poison control centers in the United States have logged thousands of cases. Pregnant women and children who are exposed are especially vulnerable to health issue, but the pets themselves are even more susceptible as they have even more direct exposure. (76) Each year in the United States, there are 4,500,000 dog bites, (302) some of them fatal. In addition, there are hundreds of thousands of cat bites each year, and more than 12,000 *Homo sapiens* are diagnosed with cat scratch disease (CSD), a zoonosis caused by *Bartonella henselae*. (552) Should it not be against the law to train an unwitting dog to attack and kill for any reason? If pet owners were more responsible and not allowed to train dogs to attack and kill, could these yearly dog attacks be reduced and perhaps eliminated? How many millions of *Homo sapiens* are scratched by house cats each year? How many millions of snake, pig, rat, monkey, and other domesticated fauna bites occur around the world each year?

The 163,800,000 dogs and cats which are in the United States consume vast quantities of food and water, while also producing an enormous amount of urine and feces, which too often is not properly disposed of by pet owners in many cities. Many pets are overfed from owners feeding them too much food, while other pets are underfed by owners which are too poor to afford the expense of a pet, or simply ignore the pet and forget to feed it. Some cat owners, which have a domesticated cat living outdoors full or part-time, have told stories of their cats killing birds, mice, insects, and other faunae and leaving the carcass as a gift for the owner, thus the cat is not even killing the fauna out of hunger or for consumption. How many thousands of wild birds are killed each year like this by domesticated cats? How many millions of tons of cat litter containing zeolite, diatomite, sepiolite, crystalline silica, silicon dioxide, silica dust, and/or other toxic chemicals is buried in landfills or in backyards since its commercial inception in 1947? Why can't simple sand be used with a natural odor absorbent like sodium bicarbonate and perhaps a natural disinfectant and smelling agent like lemon, tea tree, mint, pine, or another natural source?

Pets are often purchased as a fad after having been seen in some form of advertisement or entertainment. A good example of this is the chihuahua, as a result of some gullible *Homo sapiens* exposure to ads such as the Taco Bell Chihuahua and movies like Beverly Hills Chihuahua, there was an influx of pet chihuahuas, many of these owners unfortunately didn't realize, until after they acquired it, that the breed has a natural tendency to be obnoxious and has an aggressive temperament. As a result, many chihuahuas were either given to fauna shelters or abandon by their owner on the city streets resulting in an influx of stray chihuahuas in some cities. 75% of the dogs that arrived at the Oakland California shelter in 2014 were chihuahuas and Los Angeles, Phoenix, and some other cities also have large feral chihuahua populations. (588)

Many countries and states within these countries do not have any laws to prevent the sale or ownership of exotic florae and faunae. These exotic pets are often purchased to symbolize wealth, social status, or domination over a wild species of fauna. In October 2011, exotic pet owner Terry Thompson, who neighbors described as a gun-crazed fauna lover, released the 56 captive faunae he had acquired before committing suicide. The incident resulting in police shooting and killing 49 of the fauna which included Bengal tigers, lions, black bears, mountain lions, grizzly bears, wolves, baboons, leopards, and monkeys. (148) Pablo Escobar's Hacienda Napoles was once home to many exotic animals, but now since its abandonment some of the faunae like the hippopotamuses have become feral and now inhabit the nearby Magdalena River. (223)

Some perverted pet owners have zoophilia and even go so far as to have a sexual relationship with faunae, which is even still legal in some countries around the world and until recently was even allowed by law in many U.S. states. In 2000, bestiality was still legal in 27 U.S. states, but as of February 2018 there were 45 U.S. states which have ban sexual acts with faunae, while 5 states and the District of Columbia have decriminalized it as a result of repealing sodomy laws.

Other Exploitation of Florae and Faunae

Each year billions of dying florae are incorporated into weddings, anniversaries, birthdays, funerals, clothing, jewelry, memorials, Valentine's Day, Mothers' Day, Easter, Christmas, and many other holidays, festivals, traditions, celebrations, and religious ceremonies throughout the world. To fulfill this massive demand, there are thousands of florists large and small which sell a variety of dying flora species. In addition, there are thousands of other outlets like grocery stores, convenient stores, and even individual street peddlers which sell dying florae. The direct environmental impact through the use of fertilizers, pesticides, and water alone are enormous during the production phase, and this is in addition to the pollution which is generated through the transportation process to the florist, and even the delivery service which many florists offer. Florists utilize additional amounts of water to maintain their inventory, and often they contaminate this water with various powdered and liquid nutrients to decrease the decay process of the dying florae. Florists also create additional waste by incorporating plastic containers, bags, and other decorative nick-nacks and trinkets, all of which usually ends up in a landfill. In the United States alone, there were 7,747,000 *Alstroemeria*, 896,000 *Dianthus caryophyllus*, 7,777,000 *Chrysanthemums*, 12,671,000 *Delphinium nudicaule*, 106,680,000 *Gerbera*, 60,778,000 *Gladioli*, 43,787,000 *Iris*, 82,551,000 *Lilium*, 9,010,000 *Lisianthus*, 4,682,000 *Orchidaceae*, 27,812,000 *Rosa*, 43,863,000 *Antirrhinum*, 167,378,000 *Tulipa*, and 33,319,000 *Rumohra adiantiformis* harvested in 2015, with California accounting for 78% of the total cut flower value. (532)

Flower preservation is a recent trend which has utilized various toxic chemicals like silica gel, borax, and glycerine to preserve floral arrangements. Some have a fascination with picking wild florae, either to put it into a vase and watch slowly die, while others, instead of purchasing from a florist, pick wild florae to display their sentiment. Is raising florae to be hacked into pieces and watch slowly die truly the best method to express one's sentiment? Does killing beautiful living florae really symbolize love, sorrow, or another emotion, or is it nothing more than a display of unnecessary exploitation and dominance over another species done because of an antiquated tradition? Would it not perhaps be more sentimental to instead give a living flora in a container or plant a new flora in the ground, and be reminded for a longer period? Would fruit bearing flora not be more of a true and continuous expression and reminder of this sentiment during each harvest? Could not this pointless negative and destructive interaction with florae be replaced with a walk amongst nature, looking at the biodiversity of all florae which is on display? How many thousands of lei are given to Hawaiian tourist each year, only to be discarded soon after?

Snakes, crocodiles, monkeys, birds, and other faunae are also used for entertainment purposes, and are most often performing to ultimately show *Homo sapiens* dominance over nature, especially if the species is deadly. Faunae are trained to perform in movies and television shows, with pet owners and fauna trainers sometimes making enormous profits. Faunae are hauled around in semi-trucks and kept confined in small cages to perform in circuses, carnivals, parades, and made to give rides. In May 2017, after 146 years, Ringling Bros. Circus announced it would cease operations after declining attendance following public outcry in 2015 over elephant abuse. Worldwide, there are hundreds of other similar shows using a wide variety of faunae. In 2017, there were 19 other circus operations exploiting some 200 faunae in the United States, but this could soon end if the H.R. 1759 – Traveling Exotic Animal and Public Safety Protection Act passes which would outlaw the use of exotic fauna in circuses, carnivals, parades, and for rides. (321) Why did it take 146 years for the public and politicians to recognize and stop the abuse which had occurred for so many years?

The exploitation of faunae for competition, like: fauna shows, horse racing, chicken runs, snail racing, turtle racing, greyhound racing, cock fighting, dog fighting, etc. has existed for thousands of years and only continues to thrive. Since 1973, the Iditarod Trail Sled Dog Race has exploited teams of dogs for 1,000 miles generally through blizzards with the wind chill below -100°F (-73°C), sometimes physically abusing the dogs, all to supposedly commemorate the 1925 serum run to Nome. There are more than 60 similar dog sled races held throughout the world. Cockfighting, dogfighting, and other fauna fighting has been engaged in for more than 6,000 years, and while all forms of fauna fighting have been completely outlawed in the United States and most other countries, these blood sports are still engaged in legally and illegally by thousands around the world in many other countries. Faunae are pitted against each other usually until the death or severe injury of one of the

opponents. Since the 1960s, Indonesians in West Java have engaged in adu bagong, which is the fighting of wild boars and dogs, and if the dog wins it lives to fight another day, and if it loses it is killed and then butchered so the meat can be sold for consumption. (598)

Bullfighting is the last of the Roman era human-versus-animal events, and it is still practiced in Spain, Portugal, France, India, Tanzania, Mexico, Colombia, Ecuador, Venezuela and Peru. Each year hundreds of bulls are killed during these barbaric sporting events. Bull wrestling or cow fighting is a non-lethal blood sport still practiced in the Balkans, Turkey, and parts of Asia where two bulls or cows are agitated and then pitted against each other until one is declared the winner. The running of the bulls is still practiced in Spain, Portugal, Mexico, and France where small groups of *Homo sapiens* run in front of 6 or more bulls for 875 meters. Toro embolado is still practiced in many towns throughout Spain, in which flammable materials are attached to the bull's horns and then lit, the bull is then allowed to roam while participants dodge the bull. During the annual Bous a la Mar festival bulls are run through the streets to the local harbor where participants try to make bulls fall into the Mediterranean. Rodeos are held worldwide in which thousands of horses, cows, and bulls are forced to engage in a variety of violent sporting events based around endurance and speed. Some participants utilize electric prods, spurs, whips, ropes, and drugs to enhance performance. Why are these faunae still exploited and often killed for entertainment? Will these senseless and barbaric forms of entertainment ever end? How is the exploitation of faunae considered a sport when the fauna is forced to participate, is this not better defined as coercion, oppression, and intimidation? How can such blatant violence and death be recognized as a sport or form of entertainment? Why is some exploitation of faunae justified as being cultural or traditional? How truly advanced is a society that engages in such barbaric behavior?

For 5,000 years, *Homo sapiens* have been exploiting silkworms to make silk, during the process, the pupae never reach the adult stage as they are boiled alive and killed in order to obtain the silk. In 2017, there were an estimated 70,000,000 pounds of silk being produced each year, it takes 2,500 silkworms to produce 1 pound of silk, amounting to 175,000,000,000 silkworm pupae killed each year to make this luxury fabric. In 2005, a group of around 80 *Homo sapiens* collected more than 1,000,000 spiders over a 4-year period and extracted silk to make an 11-foot by 4-foot textile. (322) What point did this serve? What other positive things could have been accomplished with these resources and time?

In France and the Netherlands, the military and police are using eagles to eliminate remote-controlled drones which enter restricted airspace. (610) And in Los Angeles and other parts of Southern California, falconers use hawks to scare away seagulls, pigeons, and other birds which are deemed to be pests. (604) Similarly, a border collie is used in an effort to chase away ducks, geese, crows, gulls, and snowy owls from the Cherry Capital Airport in Traverse City, Michigan. (640) Do these ruthless handlers really think that these pointless attempts to control birds will be successful? Are they not outnumbered, and does nature not have far more time available to play this silly cat-and-mouse game? Do they forget that birds outlived their dinosaur counterparts, will these birds not somehow adapt to this threat as they always have for millions of years? Could not more legislation be enacted to regulate drones instead of exploiting eagles?

The horse, donkey, ox, water buffalo, camel, elephant, and llama are probably the most exploited beasts of burden throughout the last 5,000 years. They have all been exploited, for either war, entertainment, agricultural, transportation, racing, construction, or for consumption, sometimes unknowingly as previously mentioned. Still today millions of draft animals are widely used around the world for labor. Must *Homo sapiens* still resort to using horses, mules, elephants, or other fauna to accomplish tasks? Do *Homo sapiens* not have far superior technological replacements for this barbarically antiquated practice? Will there ever be an end to the barbaric exploitation of faunae for labor by *Homo sapiens* who capture, breed, train, and dominate faunae with food and often physical abuse?

How many millions of florae and faunae have been killed and taxidermized for specimen collections? How many birds and other faunae did early scientists and painters kill to study and paint in detail? How many thousands of faunae have been barbarically tagged in an attempt to track the fauna? How many thousands of these tags are lost and left to pollute an ecosystem? How many thousands of faunae are still sacrificed each year as part of

bizarre pseudo religious rituals? How many billions of fireflies have perished as a result of *Homo sapiens* practicing the cultural tradition of catching fireflies in a jar? How many other billions of insects have died as a result of being captured and imprisoned in a container for no purpose only to watch it slowly die?

Worldwide, flora and fauna species have been decimated over the last 10,000 years and more especially in the last 500 years as a result of *Homo sapiens* in their conquest of new lands. From the extinction of the passenger pigeon to the extirpation of an estimated 25,000,000 bison, there have been billions of faunae murdered, and some species even driven into brink of extinction all in the name of conquest and money. The extirpation of beavers, wolves, coyotes, raptors, bears, mountain lions, snakes, and other faunae in the United States occurred in the 1800's and early 1900's, and the rippling effects which this had on ecosystems can still be seen today. In addition, the florae and landscapes underwent massive devastating changes from anthropogenic activities, from mining to nuclear bomb testing. Muleteers of the past decimated the rainforest of South America for no reason other than convenience, J. Eric S. Thompson remarked that,

“Yalloch had been a chicle station for so long that there was no fodder for our mules within two miles of camp. Everywhere in the Peten on high ground the breadnut tree grows, the leaves of which are the mainstay of mules in the grassless forest. Unfortunately, the Central American muleteer, with no thought for the morrow frequently cuts down a whole tree for his mules, with the result that in a few years the forest within a radius of a mile or more of any water hole is denuded of breadnut trees. If he would cut off a few branches as needed, there would never be a shortage, but such foresight is alien to the makeshift attitude of the average muleteer; it is easier to chop down a tree than to climb it. I have seen muleteers lay their axes to a wild cherry tree as they quickest way of getting a handful of cherries.” (605)

Millions of faunae are bred and slaughtered every year for the sole purpose of harvesting their skins to support the ancient practice of wearing fauna skins, although now it is done purely as a fashion statement and not solely to keep warm. Throughout the world barbaric methods of slaughter are still used, and in China some animals are skinned alive and others are beaten to death with a stick. (284) 5,000,000 crocodilian skins were traded globally in 1976, in 1996 that number fell to 1,500,000 (323) and from 2000 to 2010 the annual average was 1,300,000. Amounting to more than 52,000,000 Crocodilia killed over the last 40 years for their skins to create handbags, shoes, and other products. (324) In Australia, 1,632,098 wild kangaroos were killed for their skins and for consumption in 2015. (325) In 2015, there were 84,000,000 minks killed for their fur. (573) Down feathers are used for the stuffing in clothing and bedding, and although they are the byproduct of some 670,000,000 ducks and geese which are killed each year for consumption, mainly in China, down feathers still a form of exploitation. There are also more than 1,000,000,000 sheep worldwide which are exploited for their wool, milk, and meat. In addition, there are more than 3,500,000 Alpacas and more than 7,000,000 Llamas throughout the world, mostly in North and South America, which are exploited for their undercoat.

In 1800, there were an estimated 20,000,000 African elephants, in 1979 it was estimated to be around 1,300,000 in 37 African states, by 1989 only 600,000 elephants remained, and the Great Elephant Census of 2016 counted 352,271 elephants in the 18 countries. (338) Every day elephants continue to be slaughtered for their tusks in order for an elite few to make a fashion statement with ivory products from chopsticks to jewelry. If ivory must be used, could not the tusks from the estimated 10,000,000 frozen mammoths buried in Siberia be used instead of those from living Elephants? How many millions of elephants have been slaughtered for their ivory since the trade began over 2000 years ago? The 2016 documentary, *'The Ivory Game'* directed by Kief Davidson and Richard Ladkani explains how the elephant slaughter continues today and is perpetuated mainly by the ivory trade, but also through direct confrontations with farmers in Africa who complain the wild elephants eat their food crops and believe the only solution is to kill the elephants. The two largest and main consumers of ivory until recent legislation had been China and the United States, in 2016 the United States enacted a near-total elephant ivory ban and China has committed to ending all ivory trade by the end of 2017. In addition, Asian elephants in Myanmar are being killed not for their tusks, but instead for their skins and meat. (30) Captive elephants are also exploited each year by millions of tourists which pay to ride, touch, and take selfies with a few thousand captive elephants in Nepal, Cambodia, Thailand, India, Laos, Sri Lanka, and other parts of the world. Many of these elephants are kept in small confined areas, work non-stop all day without resting, and nearly all have been captured in the wild and have been tamed by being beaten and tortured into submission. (405)

Illegal and Legal Trade of Florae and Faunae

Harvesting florae and faunae from the wilds of nature to sell, be it on the black market, openly on the Internet, or at a weekend flea market, is now a common occurrence throughout the world. One need only look online to easily find almost any species of flora or fauna for purchase and direct delivery. There are very few law enforcement personnel devoted specifically to the task of flora and fauna protection, and more especially towards the preventable black-market industry of flora and fauna trafficking. If more police and legal resources were allocated at local, state, and federal levels this industry could perhaps be eliminated. And yet as these florae and faunae are being slaughtered and traded for their black market economic value, as the armies of the world which have the power to protect nature in the remote ecosystems of the world sit idly by waiting for a war that is going on right under their radar. And as the War for Earth is being lost because of money, greed, ignorance, and because of little or no enforcement of environmental laws, these florae and faunae continue to perish at alarming rates, and no matter how much warning or awareness, many *Homo sapiens* still seem to either ignore the issue or simply have no morals. J. Eric S. Thompson wrote,

“...kindness to animals is a rare feature of civilization...” (28)

In 1973, CITES was established by conservation groups, and in 2017 it had 183 parties which all support the international trade and exploitation of florae and faunae in a supposedly sustainable manner. From 2005 to 2009, CITES recorded the legal annual trade of 317,000 live birds, 2,000,000 live reptiles, 2,500,000 crocodilian skins, 1,500,000 million lizard skins, 2,100,000 snake skins, 73 tonnes of caviar, and 1,100,000 coral pieces. (328) The legal and illegal trading of exotic florae and faunae combined with the harvesting of exotic fauna skins, tusks, and other body parts now perpetuate a \$600,000,000,000 industry based on the direct exploitation of nature, and more importantly of other sentient beings. Between 1999 and 2015, there were 164,000 seizures of wildlife which were being traded illegally and added to the World WISE database. (563) The United Nations Environment Programme reported there were 643 chimpanzees, 48 bonobos, 98 gorillas, and 1,019 orangutans confiscated or confirmed, with an estimated 9,301 presumed dead, and 11,109 undetected losses between 2005 and 2011. (579) How many millions of other florae and faunae were successfully smuggled and sold illegally? How many millions of florae and faunae perish during the captivity and transportation phase from fear, stress, or mishandling? How many billions of florae and faunae have perished senselessly over the last 5,000 years all in the name of pseudo medicines, a culinary delicacy, fashion, or other exploitative excuse? William Temple Hornaday wrote,

“When we pause and consider the years, the generations and the ages that Nature spends in the production of a high vertebrate species, the preservation of such species from extermination should seriously concern us. As a matter of fact, in modern man's wild chase after wealth and pleasure, it is only one person out of every ten thousand who pauses to regard such causes, unless cornered by some protectionist fanatic, held fast and coerced to listen.

We are not discussing the animals of the Pleistocene, or the Eocene, or any period of the far-distant Past. We are dealing with species that have been ruthlessly, needlessly and wickedly destroyed by man during our own times; species that, had they been given a fair chance, would be alive and well to-day.

In reckless waste of blood and treasure, the nineteenth century has much for which to answer. Wars and pillage, fires, earthquakes and volcanoes are unhappily unavoidable. Like the poor of holy writ, we have them with us always. But the destruction of animal life is a totally different category from the accidental calamities of life. It is deliberate, cold-blooded, persistent, and in its final stage, criminal! Worst of all, there is no limit to the devilish persistence of the confirmed destroyer, this side of the total extinction of species. No polar night is too cold, no desert inferno is too hot for the man who pursues wild life for commercial purposes.”

"Here is an inexorable law of Nature, to which there are no exceptions:

No wild species of bird, mammal, reptile or fish can withstand exploitation for commercial purposes.

The men who pursue wild creatures for the money or other value there is in them, never give up. They work at slaughter when other men are enjoying life, or are asleep. If they are persistent, no species on which they fix the Evil Eye escapes extermination at their hands.

Does anyone question this statement? If so let him turn backward and look at the lists of dead and dying species." (625)

The exploitation of wild flora and fauna species through trade will most likely only continue to thrive, especially when there are conventions like CITES and programs like TRAFFIC which encourage this quasi-conservation. In reality these conventions and programs are nothing more than the legalization and regulation of the exploitation of flora and fauna through trade, while being portrayed as something that should be tolerated and even encouraged so long as it is sustainable. Coexistence should be encouraged, while acceptance and sustainability of the exploitation of species discouraged. The mentality that it has always been done, will always be done in the future, so if it is going to be done it should be done sustainably, is absolutely the wrong attitude to have. Change brought through education and access to previously unknown resources can help to end flora and fauna exploitation. Fauna should never be exploited in any manner, be it in the wild or in a domesticated setting, and flora should only be utilized when it is grown and harvested in a sustainable eco-friendly manner, and never from a wild source.

In the January 2010 issue of National Geographic Magazine, Mark Leong conducted an interview with international animal smuggler Wong Keng Liang, aka Anson Wong, who has traded a vast array of fauna since the 1980's making millions of dollars while using a zoo as a cover. Leong described how a zoo cover operation using CITES paperwork functions in saying,

"Zoos make good cover. Smugglers in control of a zoo can move endangered species with CITES paperwork, and a zoo can use its breeding program to explain the appearance of a new animal. CITES generally doesn't monitor what happens to an animal after a zoo imports it: A gorilla can be sold domestically, or if it dies (or is killed), can be cut up for meat, or parts, or even stuffed.

In some Asian countries, tourist attractions called tiger parks secretly operate as front operations for tiger farming-butchered captive tigers for their parts and offering a potential market for wild-tiger poachers too. (Keeping an adult tiger cost \$5,000 a year in food alone, but a bullet costs only a dollar.)"

Fauna Experimentation

There are no accurate global statistics on how many fauna are used in laboratories each year, but based on a 2008 study which collated data for 37 countries, a conservative estimate is that there are 58,300,000 fauna used in 179 countries each year, with a more comprehensive figure of 115,300,000 fauna still most likely to be an underestimate. (631) And although René Descartes foolishly argued that fauna lack consciousness and therefore are incapable of feeling pain, the reality is that most all species of fauna do feel pain, and thus are capable of suffering, a fact which is easily demonstrated when a species reacts to negative stimulation. Pain has nothing to do with consciousness or intelligence, pain is a feeling which most all species feel, it is a defensive mechanism. One need only watch James Marsh's 2011 documentary *'Project Nim'* to see the real story behind the famous Nim Chimpsky born in 1973.

Fauna testing, fauna experimentation, fauna research, in vivo testing, and vivisection are conducted on mice, rats, cats, dogs, non-human primates, (e.g. baboons, chimpanzees, spider monkeys, marmosets, squirrel monkeys, macaques, etc.) fish, rabbits, amphibians, guinea pigs, hamsters, insects, and a variety of other fauna in an attempt to test products or validate some scientific or medical theory. Barbaric tests such as the Draize Test, LD50, acute toxicity limits, chronic toxicity limits, and others are performed, all in the name of product safety to test the limits on consumer products made with known toxic chemicals. Would all this testing even be necessary if products were made with more natural less toxic ingredients? Can misleading fauna models reliably predict effects in *Homo sapiens*? How can it be unethical to test these products on *Homo sapiens*, yet it is ok to test on another fauna species even though the results may be completely different? Don't all fauna species have an intrinsic right not to be used or experimented on? If the fauna physiology is affected by pain during the process, does this not render the results unreliable? Is it not possible to achieve many of the same results through computer simulations?

In an effort to replicate wartime injuries, the United States Coast Guard and other military branches conduct *'Live Tissue Training'*, as required by the Department of Defense, in which they injure fauna and attempt to practice medical procedures. Video surfaced of a Coast Guard training session conducted on March 3, 2012

which showed government contractors using hedge clippers to cut the limbs off several anesthetized goats. (633) Millions of additional faunae are also used for classroom dissections in an attempt to educate. Have there not been enough visually documented tests so that students could instead watch a video or see an image to illustrate the lesson? Why are students forced to dissect faunae when most probably have no interest or desire to do such a barbaric act? Will future technology allow for scanning of a species instead of dissecting it? Couldn't a computer perhaps be programmed to analyze a species better than *Homo sapiens* without dissection?

Hunting

Hunting is nothing more than premeditated murder of a defenseless sentient being which does not intend any harm, is not attacking, and is usually murdered without even seeing the murderer. Future generations may look back and ask why their ancestors killed faunae so senselessly after they had progressed so far as a civilization and had no need to kill faunae in order to eat, as there was an abundance of alternative food sources available. The number of hunters has only grown with more and more *Homo sapiens* taking up the sport, but with education, resistance from the public majority, and other forms of entertainment taking the place of hunting perhaps this trend will reverse. In the United States, there were 14,138,182 hunting licenses issued in 1958, by 2017 the number of hunting licenses, tags, permits, and stamps issued increased to 36,824,655 costing hunters \$853,044,890, and making it a very profitable area for the government. (504) How can anyone with morals and who professes a love for freedom and life murder another sentient being in cold-blood? Food is not an issue, clothing is not an issue, modern society with technology and science provides everything to sustain life, so is it perhaps the thrill of the hunt and the act of committing legal murder?

When hunting season approaches each year in United States National Forests, one will notice that big game faunae tend to be more vigilant and will also flee *Homo sapiens*, often hiding in very remote pockets of the ecosystem to avoid hunters, demonstrating that these faunae are sentient beings. There have also been documented accounts of grizzly bears which are being hunted, covering their tracks or concealing themselves with rocks and trees, proving once again that these sentient beings are very aware that they are being hunted. (574) It has been theorized that mammals used the cover of darkness to escape dinosaur predators and competitors during their first 100,000,000 years on Earth, and it was after the extinction of the dinosaurs that mammals emerged during daylight hours. (564) A recent meta-analysis of 76 studies of 62 species has also suggested that some mammals are reverting to this behavior to avoid contact with *Homo sapiens* when they engage in activities from hunting to hiking, or simply to avoid them in urban areas, and that this may potentially be more harmful to species overall and not beneficial. The authors stated,

"Our analysis revealed a marked increase in nocturnal activity. Overall, mammal nocturnality increased by a factor of 1.36 [95% confidence interval (CI), 1.23 to 1.51] in areas or time periods of high human disturbance relative to nocturnality under low-disturbance conditions. For example, an animal that typically split its activity evenly between the day and night would increase its proportion of nocturnal activity to 68% of total activity near human disturbance. Of the 141 effect sizes, 83% corresponded to an increase in nocturnality in response to humans."

"Although most mammals possess some sensory adaptations to nighttime activity due to nocturnal mammalian ancestors, many species have evolved traits that optimize diurnal behavior. When active at other times, diurnally adapted animals may suffer from reduced hunting and foraging efficiency, weakened antipredator strategies, disruption of social behavior, poor navigational capacity, and higher metabolic costs, all of which can compromise reproduction and survival." (568)

Thousands of big game hunting ranches now exist throughout the world where trophy hunters can kill lions, bears, African leopards, African buffalos, African elephants, hippopotamus, deer, sheep, antelope, southern white rhinos, and a variety of other big game and exotic faunae. In the United States, the exotic wildlife industry has more than 3,750 operations which generated \$1,300,000,000 of economic activity in 2007, a major customer of this industry were hunters. There are a variety of faunae available at these exotic wildlife ranches, in Texas alone there are 125 different species. (565) The faunae are bred and raised on a ranch usually for the explicit purpose of being hunted, killed, taxidermized, and mounted as a trophy on the wall of a murderer. Some of these faunae have also escaped from ranches becoming invasive to ecosystems. Taxidermy is perhaps the most morbid aspect of hunting. To kill a species of fauna, taxidermy the remains, and then put it on display could be interpreted as psychotic behavior, much like a serial killer who keeps trophies from victims. From 2005 through 2014, United

States sport hunters killed and imported the taxidermized remains of 1,260,000 animals from other countries around the world. Some of the faunae hunted were lions, bears, geese, elephants, rhinos, bison, leopards, ducks, impala, wildebeest, kudu, gemsboks, springboks, and boneboks. (327) For nearly 500 years foxes have also been hunted throughout the world for sport. How many millions of faunae are killed for nothing more than sport and not eaten each year? How many millions of faunae have been killed simply for entertainment, a challenge, or target practice?

As guns are more widely available along with other technology, many wild faunae are being eaten into extinction by starving *Homo sapiens* around the world. Each year in central Africa, starving rural *Homo sapiens* consume some 2,200,000,000 pounds of 'bushmeat' obtained from elephants, gorillas, and other large forest mammals. (380) If alternative foods were more abundantly available to these starving *Homo sapiens*, would this meal of extinction still be occurring? A 2016 assessment on bushmeat hunting and extinction risk revealed,

"301 terrestrial mammal species are threatened with extinction due to hunting by humans. All of these species occur in developing countries.

The primary reason for hunting and trapping these mammals is to acquire meat for human consumption, medicinal products, ornamental use and pet trade.

Species affected by severe hunting are also often victims of habitat deterioration, expanding agriculture, human settlement encroachment and livestock competition.

There has been little conservation progress in reversing the fate of these threatened mammals despite several major summits convened on biodiversity conservation and protected areas." (381)

The indigenous *Homo sapiens* of the past not only in North America but around the world had a far different perspective on hunting, and one which involved far more respect for nature. Theodora Kroeber in comparing the modern-day hunter with Ishi wrote,

"By contrast, Ishi the hunter, and modern man the hunter, shared neither weapons, techniques, nor attitudes. Modern man hunts for sport, and he is wasteful of the game he takes, his need being not for the animal which he has killed, but to engage briefly and violently in the act of killing. Ishi hunted to live, used each hock and hair of the animal he killed, and lived in proximity to, and knowledge of, all animal life. American Indian mythology which has it that people were animals before they were people, recognized, in however literalistic a fashion, man's biological continuity with all animal life, a system of belief which precludes the taking for life except with respect for it in the taking."

"The extent of simple curiosity in birds and mammals, which primitive hunters exploit to their profit, is not available to the hunter of gun-shy game-the explosion of a gun introduces a terror which paralyzes other reactions and emotions. Ishi, or any solitary hunter with the bow, brings no seeming strangeness to the forest scene, being himself an enemy within the usual animal understanding of the concept, as is the skunk to the quail, the coyote to the rabbit, or the mountain lion to the deer." (99)

Some modern-day indigenous *Homo sapiens* want the right to kill faunae like: whales, polar bears, seals, etc. and tradition is often cited as the reason. But most of these indigenous *Homo sapiens* have adapted to the modern world in many other ways using snowmobiles, plastic, processed food, etc. and yet they want to preserve the antiquated tradition of harvesting whales to use for food and oil for fuel when it is completely unnecessary. If these tribes were living 100% in the traditional ways of their ancestors this would perhaps be justifiable, but they are not as they have many modern things which aid them. There are very few indigenous *Homo sapiens* that have not been assimilated in some form by modern society and technology from having plastic items to electricity. Keeping a tradition active when there is no point other than tradition when it exploits nature unnecessarily is not tradition, it is nothing more than the unnecessary exploitation of another living species. What if one were to keep a tradition active like cannibalism or human sacrifice because it was a tradition thousands of years ago, would this ever be considered justifiable? So why then aren't faunae also protected from murderous and unnecessary traditions?

Some Species Extirpated to Near Extinction	
Species	Description
European Wolf	The extermination of Northern Europe's wolves first became an organized effort during the Middle Ages, and

	<p>continued until the late 1800s. In England, wolf persecution was enforced by legislation, and the last wolf was killed in the early sixteenth century during the reign of Henry VII. Wolves survived longer in Scotland, where they sheltered in vast tracts of forest, which were subsequently burned down. Wolves managed to survive in the forests of Braemar and Sutherland until 1684. The extirpation of wolves in Ireland followed a similar course, with the last wolf believed to have been killed in 1786. A wolf bounty was introduced in Sweden in 1647, after the extermination of moose and reindeer forced wolves to feed on livestock. The Sami extirpated wolves in northern Sweden in organized drives. By 1960, few wolves remained in Sweden, due to the use of snowmobiles in hunting them, with the last specimen being killed in 1966. The grey wolf was exterminated in Denmark in 1772 and Norway's last wolf was killed in 1973. The species was almost wiped out in 20th century Finland, despite regular dispersals from Russia. The grey wolf was present only in the eastern and northern parts of Finland by 1900, though its numbers increased after World War II. Although the Finnish wolf population rose by 2005 to approximately 250 individuals, by 2013 their numbers had again declined to the mid-1990s figure of around 140. This was despite government measures to keep breeding numbers viable. At the beginning of 2016 the wolf population was approximately 300 - 350 individuals.</p> <p>In Central Europe, wolves were dramatically reduced in number during the early nineteenth century, due to organized hunts and reductions in ungulate populations. In Bavaria, the last wolf was killed in 1847, and had disappeared from the Rhine regions by 1899 and largely disappeared in Switzerland before the end of the nineteenth century. In 1934, Nazi Germany became the first state in modern history to place the wolf under protection, though the species was already extirpated in Germany at this point. The last free-living wolf to be killed on the soil of present-day Germany before 1945 was the so-called "Tiger of Sabrodt", which was shot near Hoyerswerda, Lusatia (then Lower Silesia) in 1904. Today, wolves have returned to the area. Wolf hunting in France was first institutionalized by Charlemagne between 800–813, when he established the <i>louveterie</i>, a special corps of wolf hunters. The <i>louveterie</i> was abolished after the French Revolution in 1789, but was re-established in 1814. In 1883, up to 1,386 wolves were killed, with many more by poison.</p> <p>In Eastern Europe, wolves were never fully exterminated, due to the area's contiguity with Asia and its large forested areas. However, Eastern European wolf populations were reduced to very low numbers by the late nineteenth century. Wolves were extirpated in Upper Hungary during the first decade of the twentieth century and, by the mid-twentieth century, could be found only in a few forested areas in eastern Poland. Wolves in the eastern Balkans benefitted from the region's contiguity with the former Soviet Union and large areas of plains, mountains and farmlands. Wolves in Hungary occurred in only half the country around the start of the 20th century, and were largely restricted to the Carpathian Basin. Wolf populations in Romania remained largely substantial, with an average of 2,800 wolves being killed annually out of a population of 4,600 from 1955–1965. An all-time low was reached in 1967, when the population was reduced to 1,550 animals. The extermination of wolves in Bulgaria was relatively recent, as a previous population of about 1,000 animals in 1955 was reduced to about 100–200 in 1964. In Greece, the species disappeared from the southern Peloponnese in 1930. Despite periods of intense hunting during the eighteenth century, wolves never disappeared in the western Balkans, from Albania to the former Yugoslavia. Organized persecution of wolves began in Yugoslavia in 1923, with the setting up of the Wolf Extermination Committee in Kocevje, Slovenia. The committee was successful in reducing wolf numbers in the Dinaric Alps.</p> <p>The grey wolf's range in the Soviet Union encompassed nearly the entire territory of the country, being absent only on the Solovetsky Islands, Franz-Josef Land, Severnaya Zemlya, and the Karagin, Commander and Shantar Islands. The species was exterminated twice in Crimea, once after the Russian Civil War, and again after World War II. Following the two world wars, Soviet wolf populations peaked twice. 30,000 wolves were harvested annually out of a population of 200,000 during the 1940s, with 40,000–50,000 harvested during peak years. Soviet wolf populations reached a low around 1970, disappearing over much of European Russia. As of 2017, the Grey Wolf remains regionally extinct in 8 European countries; Austria, Belgium, Denmark, Ireland, Luxembourg, Netherlands, Switzerland, and the United Kingdom.</p>
American Bison	<p>In the 16th century, North America contained 25-30 million buffalo. Bison were hunted almost to extinction in the 19th century. Less than 100 remained in the wild by the late 1880s. They were hunted for their skins, with the rest of the animal left behind to decay on the ground. After the animals rotted, their bones were collected and shipped back east in large quantities. Due to the roaming behavior of bison, their mass destruction came with relative ease to hunters. When one bison in a herd is killed, the other bison gather around the buffalo. Due to this pattern, the ability of a hunter to kill one bison often led to the destruction of a large herd of them.</p> <p>The US Army sanctioned and actively endorsed the wholesale slaughter of bison herds. The federal government promoted bison hunting for various reasons, to allow ranchers to range their cattle without competition from other bovines, and primarily to weaken the North American Indian population by removing their main food source and to pressure them onto the Indian reservations during times of conflict. Without the bison, native people of the plains were often forced to leave the land or starve to death. One of the biggest advocates of this strategy was General William Tecumseh Sherman. On June 26, 1869, the Army Navy Journal reported: "General Sherman remarked, in conversation the other day, that the quickest way to compel the Indians to settle down to civilized life was to send ten regiments of soldiers to the plains, with orders to shoot buffaloes until they became too scarce to support the redskins." According to Professor David Smits: "Frustrated bluecoats, unable to deliver a punishing blow to the so-</p>

	<p>called "Hostiles," unless they were immobilized in their winter camps, could, however, strike at a more accessible target, namely, the buffalo. That tactic also made curious sense, for in soldiers' minds the buffalo and the Plains Indian were virtually inseparable."</p> <p>After the Pacific Railway Act of 1862, the west experienced a large boom in colonist population—and a large decline in bison population. As railways expanded, military troops and supplies were able to be transported more efficiently to the Plains region. Some railroads even hired commercial hunters to feed their laborers. William Frederick "Buffalo Bill" Cody, for example, was hired by the Kansas Pacific Railroad for this reason. Hunters began arriving in masses, and trains would often slow down on their routes to allow for raised hunting. Men would either climb aboard the roofs of trains or fire shots at herds from outside their windows. As a description of this from Harper's Weekly noted: "The train is 'slowed' to a rate of speed about equal to that of the herd; the passengers get out fire-arms which are provided for the defense of the train against the Indians, and open from the windows and platforms of the cars a fire that resembles a brisk skirmish." The railroad industry also wanted bison herds culled or eliminated. Herds of bison on tracks could damage locomotives when the trains failed to stop in time. Herds often took shelter in the artificial cuts formed by the grade of the track winding through hills and mountains in harsh winter conditions. As a result, bison herds could delay a train for days.</p>
European Bison	<p>Historically, the lowland European bison's range encompassed most of the lowlands of northern Europe, extending from the Massif Central to the Volga River and the Caucasus. It may have once lived in the Asiatic part of what is now the Russian Federation. The European bison is known in southern Sweden only between 9500 and 8700 BP, and in Denmark similarly is documented only from the Pre-Boreal. It is not recorded from Britain or Ireland nor from Italy or the Iberian Peninsula. A possible ancestor, the extinct steppe bison, <i>B. priscus</i>, is known from across Eurasia and North America, last occurring 7,000 BCE, and is depicted in the Cave of Altamira and Lascaux. Another possible ancestor, the Pleistocene woodland bison, <i>B. schoetensaki</i>, was last present 36,000 BCE. Cave paintings appear to distinguish between <i>B. bonasus</i> and <i>B. priscus</i>.</p> <p>Within mainland Europe, its range decreased as human populations expanded and cut down forests. The last references (Oppian, Claudius Aelianus) to the animal in the transitional Mediterranean/Continental biogeographical region in the Balkans in the area of modern borderline between Greece, Macedonia, and Bulgaria date to the third century AD. Its population in Gaul was extinct in the 8th century AD. The species survived in the Ardennes and the Vosges Mountains until the 15th century. In the Early Middle Ages, the wisent apparently still occurred in the forest steppes east of the Urals, in the Altay Mountains, and seems to have reached Lake Baikal in the east. The northern boundary in the Holocene was probably around 60°N in Finland.</p> <p>European bison survived in a few natural forests in Europe, but their numbers dwindled. The last European bison in Transylvania died in 1790. In Poland, European bison in the Białowieża Forest were legally the property of the Polish kings until the third partition of Poland. Wild European bison herds also existed in the forest until the mid-17th century. Polish kings took measures to protect the bison. King Sigismund II Augustus instituted the death penalty for poaching a European bison in Białowieża in the mid-16th century. In the early 19th century, Russian czars retained old Polish laws protecting the European bison herd in Białowieża. Despite these measures and others, the European bison population continued to decline over the following century, with only Białowieża and Northern Caucasus populations surviving into the 20th century.</p> <p>During World War I, occupying German troops killed 600 of the European bison in the Białowieża Forest for sport, meat, hides, and horns. A German scientist informed army officers that the European bison were facing imminent extinction, but at the very end of the war, retreating German soldiers shot all but nine animals. The last wild European bison in Poland was killed in 1921. The last wild European bison in the world was killed by poachers in 1927 in the western Caucasus. By that year, fewer than 50 remained, all held by zoos. The current estimated total worldwide population is around 4,663 (including 2,701 free-ranging) and has been increasing.</p>
American Bald Eagle	<p>In 1930 a New York City ornithologist wrote that in the state of Alaska in the previous 12 years approximately 70,000 bald eagles had been shot. Many of the hunters killed the bald eagles under the long-held beliefs that bald eagles grabbed young lambs and even children with their talons, yet the birds were innocent of most of these alleged acts of predation (lamb predation is rare, human predation is thought to be non-existent). Later illegal shooting was described as "the leading cause of direct mortality in both adult and immature bald eagles," according to a 1978 report in the <i>Endangered Species Technical Bulletin</i>.</p>
Grizzly Bear	<p>In North America, grizzly bears previously ranged from Alaska down to Mexico and as far east as the western shores of Hudson Bay. Only about 1,500 grizzlies are left in the lower 48 states of the US. Of these, about 800 live in Montana. About 600 more live in Wyoming, in the Yellowstone-Teton area. There are an estimated 70–100 grizzly bears living in northern and eastern Idaho. Its original range included much of the Great Plains and the southwestern states, but it has been extirpated in most of those areas. Combining Canada and the United States, grizzly bears inhabit approximately half the area of their historical range.</p>
Eastern Wolf	<p>Before the arrival of Europeans, eastern wolves may have numbered at 64,500–90,200 individuals. The species ranged throughout the wooded and open areas of eastern North America, from the Maritime provinces and southern Quebec to approximately the southern United States and westward to the Great Plains. The region's indigenous human populations didn't fear eastern wolves, though they did occasionally catch them in traps, and their bones occur in native shell heaps. The eastern wolf is particularly susceptible to hybridization, due to its close relationship</p>

	to the coyote and its ability to bridge gene flow between both coyotes and gray wolves. Furthermore, human persecution over a period of 400 years caused a population decline which reduced the number of suitable mates, thus facilitating coyote gene swamping into the eastern wolf population. Aside from posing a threat to a unique species, the resulting eastern wolf-coyote hybrids are too small in size to substitute pure eastern wolves as apex predators of moose and deer. The main nucleus of pure eastern wolves is currently concentrated within Algonquin Provincial Park, eastern Ontario and south central Quebec.
Sperm Whale	Spermaceti, obtained primarily from the spermaceti organ, and sperm oil, obtained primarily from the blubber in the body, were much sought after by eighteenth, nineteenth, and twentieth century whalers. These substances found a variety of commercial applications, such as candles, soap, cosmetics, machine oil, other specialised lubricants, lamp oil, pencils, crayons, leather waterproofing, rust-proofing materials and many pharmaceutical compounds. Ambergris, a solid, waxy, flammable substance produced in the digestive system of sperm whales, was also sought as a fixative in perfumery. The hunting led to the near extinction of large whales, including sperm whales, until bans on whale oil use were instituted in 1972. The International Whaling Commission gave the species full protection in 1985 but hunting by Japan in the northern Pacific Ocean continued until 1988. It is estimated that the historic worldwide population numbered 1,100,000 before commercial sperm whaling began in the early eighteenth century. By 1880 it had declined by an estimated 29 percent. From that date until 1946, the population appears to have partially recovered as whaling activity decreased, and after World War II, the whale population increases to 33 percent of the pre-whaling population. Between 184,000 and 236,000 sperm whales were killed by the various whaling nations in the nineteenth century, while in the twentieth century, at least 770,000 were taken, the majority between 1946 and 1980.
Eurasian Tree Sparrow	<p>Four Pests Campaign, was one of the first actions taken in the Great Leap Forward in China from 1958 to 1962. The four pests to be eliminated were rats, flies, mosquitoes, and sparrows. The "Four Pests" campaigns was introduced in 1958 by Mao Zedong, as a hygiene campaign aimed to eradicate the pests responsible for the transmission of pestilence and disease: the mosquitos responsible for malaria; the rodents that spread the plague; the pervasive airborne flies; and the sparrows – specifically the Eurasian tree sparrow – which ate grain seed and fruit. As a result of this campaign, many sparrows died from exhaustion; citizens would bang pots and pans so that sparrows would not have the chance to rest on tree branches and would fall dead from the sky. Sparrow nests were also destroyed, eggs were broken, and chicks were killed. In addition to these tactics, citizens also resorted to simply shooting the birds down from the sky. These mass attacks depleted the sparrow population, pushing it to near extinction. Furthermore, contests were held among enterprises, government agencies, and schools in cleanliness. Non-material rewards were given to those who handed in the largest number of rat tails, dead flies and mosquitoes, or dead sparrows.</p> <p>By April 1960, Chinese leaders realized that sparrows ate a large amount of insects, as well as grains. Rather than being increased, rice yields after the campaign were substantially decreased. Mao ordered the end of the campaign against sparrows, replacing them with bed bugs, as the extermination of the former upset the ecological balance, and bugs destroyed crops as a result of the absence of natural predators. By this time, however, it was too late. With no sparrows to eat them, locust populations ballooned, swarming the country and compounding the ecological problems already caused by the Great Leap Forward, including widespread deforestation and misuse of poisons and pesticides. Ecological imbalance is credited with exacerbating the Great Chinese Famine, in which 20–45 million people died of starvation.</p>
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Culling

Over the last few centuries, millions of faunae, from rodents to elephants, have been senselessly slaughtered in an attempt to control fauna populations, eradicate disease, and culling is even viewed by some as a necessary part of conservation. Hunting has also been justified as a necessary form of culling wild faunae, and it is often encouraged by many wildlife management agencies throughout the world. Wildlife management agencies also practice culling directly, slaughtering wild faunae they deem to be overpopulated in the protected areas they manage. Nature never directly culls species as *Homo sapiens* do, in fact it will do just the opposite and will increase a population of one species to balance out another. For example, if there is an excess amount of fish on Earth, nature will increase cormorant bird populations, if there are years with copious amounts of acorns, then nature will increase squirrel populations, and so on to counteract this excess and balance Earth's equilibrium formula. When the abnormal abundance of a food source is diminished and returns to previous levels, which is dependent on natural environmental factors, the species which is so abundant also dies off naturally and the population is kept in check. If the murder of florae and faunae are seen as justifiable for any reason, and this excuse is allowed to be used by a controlling minority of murderous tyrants from within government fish and wildlife agencies and related conservation organizations, then this pointless slaughter will only continue. In Australia, kangaroo culling has had no effect whatsoever and the kangaroo population has only grown. What right do *Homo sapiens* have in attempting to play God by controlling a species population with mass murder and

waste? Has not nature in the past balanced everything perfectly without any intervention of *Homo sapiens*?

Since 1885, the Wildlife Services division of the USDA has utilized cyanide, guns, traps, and other hunting methods in an effort to help livestock owners cull predators. Since 2000, Wildlife Services have killed more than 2,000,000 million mammals and 15,000,000 birds, and in 2014, Wildlife Services killed 61,702 coyotes, 2,930 foxes, 796 bobcats, 580 black bears, 322 wolves, 5 golden eagles, 3 bald eagles, and tens of thousands of beavers, squirrels, and prairie dogs. Several of the species killed were endangered or threatened and were also protected by the United States Endangered Species Act. How can a government agency kill a species of fauna which the same government supposedly protects under law? (445) There are no doubt thousands of other faunae which have been killed by the direct hand of the livestock owners, as well as just trigger-happy individuals out to kill for the thrill. In 2008, gray wolves which had migrated from Canada were documented in Washington State, and in 2017 there were an estimated 19 packs of 90 wolves. In 2011, the Federal Endangered Species Act protecting gray wolves was lifted, and a year later Washington Fish and Wildlife biologists began culling the gray wolf in response to the wolves poaching livestock. In 2016, after some of the wolves killed or injured 12 cattle, Washington officials made plans to cull a group of 11 wolves allegedly responsible, the latest report was that 6 of the 11 targeted wolves had been murdered by aerial kill teams. This makes the third times officials have culled the wild wolves, and the previous 2012 and 2014 cullings resulted in 10 wolves being murdered. (351) Could not the government simply have reimbursed the ranchers monetarily for the handful of cattle the wolves consumed? How much more money and other resources were wasted on hunting and killing the wolves from a helicopter?

From 1959 to 1976 in Hawaii, 4,668 sharks were killed in a culling effort which had no effect on shark attacks. (326) Another similar culling effort of great white sharks was conducted by the Australian government in 2014 and was terminated a year later after much opposition by conservationists and the public. In 2013, the English government began culling badgers in an effort to control a bovine tuberculosis outbreak, which some believed was being spread by the badgers to other faunae including some livestock. For centuries, hundreds of thousands of cormorant birds have been killed each year globally, either by being shot or the eggs destroyed, in culling efforts to protect the aquaculture industry. In the early 1970's, Allan Savory, backed by the prevailing world-view that too many elephants were causing habitat destruction, convinced the Rhodesian government to slaughter 40,000 wild elephants. This was later realized by most, including Savory himself, that it was a horrible blunder caused by a gross misinterpretation of research data. Culling used as a tool for conservation or to control invasive species can often have the opposite effect, and only make the species even more difficult to eradicate. A 2014 study stated,

"As a result of being hunted, animals often alter their behaviour in ways that make future encounters with predators less likely. When hunting is carried out for conservation, for example to control invasive species, these behavioural changes can inadvertently impede the success of future efforts. We examined the effects of repeated culling by spearing on the behaviour of invasive predatory lionfish (*Pterois volitans*/miles) on Bahamian coral reef patches. We compared the extent of concealment and activity levels of lionfish at dawn and midday on 16 coral reef patches off Eleuthera, The Bahamas. Eight of the patches had been subjected to regular daytime removals of lionfish by spearing for two years. We also estimated the distance at which lionfish became alert to slowly approaching divers on culled and uncultured reef patches. Lionfish on culled reefs were less active and hid deeper within the reef during the day than lionfish on patches where no culling had occurred. There were no differences at dawn when removals do not take place. Lionfish on culled reefs also adopted an alert posture at a greater distance from divers than lionfish on uncultured reefs. More crepuscular activity likely leads to greater encounter rates by lionfish with more native fish species because the abundance of reef fish outside of shelters typically peaks at dawn and dusk. Hiding deeper within the reef could also make remaining lionfish less likely to be encountered and more difficult to catch by spearfishers during culling efforts. Shifts in the behaviour of hunted invasive animals might be common and they have implications both for the impact of invasive species and for the design and success of invasive control programs." (20)

Extinct Species

William Temple Hornaday wrote,

"The murder of a wild-animal species consists in taking from it that which man with all his cunning never can give back, its God-given place in the ranks of living things. Where is man's boasted intelligence, or his sense of proportion, that every man does not see the monstrous moral obliquity involved in the destruction of a species?

Man, the greedy and wasteful spendthrift that he is, has not created even the humblest of the species of mammals, birds and fishes that adorn and enrich this earth. With all his wisdom, and with all his resources, man has not evolved and placed here so much as a ground-squirrel, a sparrow or a clam. It is true that he has juggled with the wild horse and sheep, the goats and the swine, and produced some hardy breeds that can withstand his abuse without going down before it; but as for species, man has not yet created and placed in the fauna of this world so much as a protozoan." (569)

Once the ending dies, a species which has evolved for perhaps millions of years becomes extinct, and there have undoubtedly been millions of endings throughout the 4,500,000,000 years of Earth's history. And while extinction is a part of nature and the process of evolution, when extinction is caused by anthropogenic activities, it is not natural, but in fact easily preventable. There are some species which have gone extinct or are threatened with extinction from anthropogenic activities, and some of these species are millions of years older than *Homo sapiens*. If based on length of time on Earth and not on the most dominant and destructive species, who has more of a right to inhabit the planet? Many would argue that *Homo sapiens* are stronger more intelligent and should rule Earth over all other species, but doesn't this perspective actually demonstrate a lack of intelligence? Wouldn't true survival of the fittest for such an intelligent capable species, such as *Homo sapiens*, be based how it can coexist on Earth without destroying everything in the process? Survival is often viewed as something that can only be done through destruction and not through coexistence, and the phrase '*survival of the fittest*' is often used out of context to justify the destruction. But has nature not shown repeatedly that it is through coexistence that it evolves and survives? Every species on Earth has an intrinsic right to life, and to think that *Homo sapiens* are the best and only species which deserves the right to life is egotistical and self-destructive. From the tiniest microscopic organism to the largest whale, all of nature should be treated with the same respect and coexisted with allowing all life to exist in a natural state, with little to no interference when at all possible. Arne Naess wrote,

"No single species of living being has more of this particular right to live and unfold than any other species." (288)

The passenger pigeon was estimated to have numbered in the billions, and it rapidly went extinct over a period of about 100 years because of poor hungry *Homo sapiens*, and as an ironic constant reminder ignored by most, millions of feral pigeons now inhabit cities throughout the world. And although there is plenty of food now, these actions show what can happen to any species of flora or fauna when another species is threatened with starvation, and conservation is not practiced. Many other song birds are said to have vanished from the Earth, killed and eaten because of the lack of food by poor starving immigrants and slaves during early America. A variety of other fauna species were also hunted by hungry explorers and buccaneers which arrived by ship to remote islands with exotic species and were literally eaten into extinction. Once *Homo sapiens* invented advanced weapons, the populations of many fauna species began to decrease dramatically, as they were killed with much more ease. J. Eric S. Thompson speculates that,

"The bow and arrow, certainly the most radical of the innovations...In fact, it may have led to a decrease in certain varieties of game, for prior to its introduction, the Maya had depended on traps and spears (clay pellets shot from blowguns were used against small birds) for their supply of game." (29)

Currently, there are more than 1,200,000 living species which have been identified and catalogued of the estimated 8,700,000 eukaryotic species globally. (286) Including microbial species, scientist estimate there are more than 1,000,000,000,000 total species on Earth. (287) There are only so many ecosystems on Earth, and a limited amount of available space in these ecosystems with millions of species all vying for a portion of this space in an effort to coexist. Over the last 500 years especially, flora and fauna species around the world have been trying to adapt to many new negative changes that result from destructive factors like: invasive species, loss of habitat due to soil and/or water contamination from toxic chemicals, encroaching *Homo sapiens* inhabiting the land or stripping the natural resources from the land, etc. As a result of these anthropogenic activities, some species have gone extinct or are on the brink of extinction, while others have adapted and are thriving. There has no doubt been dramatic population declines in many flora and fauna species, and if the exploitation of certain species of flora and fauna continues or anthropogenic activities eliminate or alter an ecosystem too much, there could possibly be more extinctions. How many undiscovered flora and fauna species have gone extinct without *Homo sapiens* even knowing they existed? How many species have gone extinct just since the times of the

Egyptians, who inscribed a variety of flora and fauna species which no longer exist? Will the cow, chicken, pig, cat, dog, and other faunae which *Homo sapiens* have created over the last 5,000 years ever become extinct?

There seems to be a widespread erroneous belief that if the population of a species is small or less than a certain number, say 100, then it is on the verge of extinction. These misleading statistical facts often confuse many *Homo sapiens* on the issue of extinction, for instance when a conservation group says the surviving number of this particular species of bird is 100, this initially sounds very dramatic that only 100 of this bird species remains on Earth, but few ever ask the question, has this species ever had a population over 100? The facts may not be so shocking if one also considers other factors and asks other questions like, perhaps 100 is all that an ecosystem can support, is the ideal habitat for the species so small that it will never have a population greater than 100? Just because a species is rare does not mean that it is on the verge of extinction. Breeding habits may have an influence, it may be limited to a certain area because of a food source or other dependency like weather, and it may even be symbiotic with another organism. In addition, one should also consider the actual number, as these numbers given are estimative and it is impossible to accurately count every member of a species. Species population numbers can give you an estimate, but it is important to remember that this estimate could be far from the actual number. And even attempting to give an accurate estimate is often irrational, especially when the species has been studied so very little. To say there are only 10 of a species left because that was all that was counted by a few *Homo sapiens* over a small timeframe in a very limited area, is not only foolish, it is a disservice to science and conservation. And just because a species population is low, does not mean that it cannot rebound naturally when the conditions are ideal. The population of flora and fauna is in a constant state of fluctuation based on many factors, a main one being the availability of habitat, and if another species destroys or occupies a habitat the species population will shrink waiting for that habitat to possibly become available again in the future.

Current Estimated Extinct Species Over the Last 500 Years		
	Known Number of Extinct Species	Number of Possible Extinct Species Species which have not been observed recently and are thought to most likely be extinct.
Amphibians	41	112
Arthropods	82	67
Fishes	65	99
Insects	81	55
Invertebrates	392	202
Mammals	71	6
Molluscs	317	119
Flora	121	142
Reptiles	26	19
SOURCES: Data compiled from U.S. Fish and Wildlife Service, Wikipedia, UNEP, and ICUN Red List		

Some have estimated that as many as 100 species go extinct every day, but these figures are based on computer modeling and are not actual documented losses. Over the last 500 years there have been less than 1,200 documented losses. It should also not be forgotten, that all flora and fauna species which currently inhabit the Earth have survived threats in the past over thousands and even millions of years. Many flora and fauna species have endured habitat loss or shifts due to extreme climate fluctuations, most recently during the last ice age. So long as small populations of a flora or fauna species exist in an ecosystem no matter how small, then they will never go extinct. There have even been numerous Lazarus taxa, or species which were thought to be extinct only to be rediscovered years later often in some remote unexplored region. The coelacanth fish was thought to have gone extinct in the Late Cretaceous, around 66,000,000 ago, only to be rediscovered in 1938. The night parrot was presumed to be extinct as it was not seen between 1912 and 1979 but is in fact just elusive and mysterious. The blue-eyed ground dove was last seen in 1941 and then rediscovered in 2015. The Táchira antpitta was last seen in 1956 and thought to be extinct but was rediscovered in 2016 inhabiting a national park. The marsupial *Dasycercus cristicauda* which was thought to have been extirpated in New South Wales and was rediscovered in 2017. The *Dasycercus cristicauda* was in fact also discovered in a national park, which also demonstrates how protected areas can provide a safe haven for species and can even help a dwindling species population to recover. Some of the endangered and threatened species listed in the table below were also thought to be extinct only to be rediscovered. How many thousands of flora and fauna species had their population numbers reduced to

perhaps a few hundred individuals, or their habitat shrunk to a very small area during the last ice age, and now thrive a few thousand years later when climatic conditions became ideal? This will most likely be the case with species which have been severely affected by anthropogenic activities, in that when and if *Homo sapiens* cease their depredations and begin coexisting on Earth flora and fauna species which remain will eventually rebound.

Perhaps some scientists and conversationalists are unreasonable extremists which are overstating their argument about the 6th mass extinction, or perhaps they are not at all. If the 6th mass extinction is truly occurring, and it is anything like the other known mass extinctions before, the diversity of florae and faunae will no doubt be once again temporarily lost. But like all previous mass extinctions nature will recover, and given enough time diversity will return, but one must not forget that the timeframe for this return will be perhaps hundreds of thousands if not millions of years. And this is one of the reasons why saving the Earth is so critical, because this extinction is not being caused by an impact from an extraterrestrial object, volcano, or other natural unpreventable event, but rather from an easily preventable one, *Homo sapiens* chosen actions. To think of the Earth with only flora and fauna species that depend on *Homo sapiens* for survival is a very dreary thought. Some think that in the future scientist will simply clone a species back into existence, but this type of Frankenstein science is not the solution. How could one ever expect to clone and create nature in such an artificial way thinking that it will thrive as nature's method of evolution does? How can one clone everything back into existence when one doesn't even know everything that existed? Would it not be more logical to solve the problem by simply changing what is causing the extinction to occur in the first place, which are the negative anthropogenic activities?

Nature is resilient and can adapt to many negative things that *Homo sapiens* do, but like everything in the universe there is a limit and a tipping point. When and if this tipping point is reached things will most certainly collapse, and many species will go extinct, possibly even at a more rapid rate. How this tipping point could be reached has been proven with factual evidence from the past depredations of *Homo sapiens*. But will Earth reach this tipping point is a question which only the future will answer. Could a future Earth have only a few thousand species that have adapted to a newly toxic environment which *Homo sapiens* have created? A bleak future this may be, but one created by the consequences of *Homo sapiens* depredations. If this tipping point is reached, do *Homo sapiens* have the technology, resources, and knowledge to maintain their own existence? Based on everything currently known, the technological level achieved up until this point, and the proven capabilities to sustain life on the space station, it seems probable. The Earth may one day be void of the diverse life that currently exists, but *Homo sapiens* have almost certainly evolved to a point where short of a catastrophic event, (e.g. extraterrestrial object impact, massive volcano eruption, Sun going supernova, etc.) they will endure most anything, even if it's in an underground nuclear fallout shelter. At some point in the future *Homo sapiens* will most likely have to abandon Earth or face extinction themselves, but until then should not coexistence be attempted through trying to live in a more harmonic way with nature?

Nature has proven without a doubt that it can evolve in order to sustain life in almost any environment. Examples of this can be seen in desiccation-tolerant lichens, in loricifera living in an oxygen-free environment, in the wide variety of tardigrades which inhabit nearly all surfaces of Earth, and in other extremophile organisms which survive and often times even thrive under extreme conditions. That is to say, some life will continue on Earth no matter the kind of environment *Homo sapiens* create as a result of their depredations. Will some species go extinct? Absolutely, how many is very dependent on *Homo sapiens* current and future actions. Some species populations will simply be reduced in number and await to return when the environmental conditions are favorable. Nature will continuously evolve to thrive around *Homo sapiens* depredations if necessary, evidence of this can clearly be seen in the many flora species which inhabit the cracks of the city streets and buildings, as well as the vacant lots and other derelict areas in cities where nature proliferates, areas which actually act as a refuge for many species and in essence help with conservation. Some species will adapt and already have, for an example of this one need only look at the faunae which inhabit cities throughout the world and their symbiotic relationship with *Homo sapiens* waste, like: ravens and pigeons feeding on city trash, the vulture which feeds on roadkill, insect species like cockroaches and ants, and mammal species of raccoon, opossum, squirrels, mice, rats, or other faunae which also clean up *Homo sapiens* waste. Further evidence can be seen in that the central North American geese population has increased from between 2,000,000 and 3,000,000 snow

geese, to 15,000,000 over the last 20 years in response to new farming methods which resulted in a more abundant food supply. (372)

There has been much debate about a mass mortality event or even the extinction of insect species like bees which pollinate some floras, and the devastating effect it could have on flora communities throughout nature as a result. Some extremists even postulate that such a die-off would cause a rippling effect, and most flora species would also go extinct as well. Yes, any die-off of an insect species would certainly have negative impacts to flora communities, but one need not forget that there are a large variety of other insect species which also pollinate floras, and that there are many species of flora which are hermaphrodites, self-pollinating, or rely on wind and not insects to reproduce. When pondering the extinction of a species due to *Homo sapiens* depredations there are many scenarios which could happen. What would happen if many insect predator species went extinct, like birds, dragonflies, damselflies, mantises, ect.? Insect populations that these predators feed on could increase dramatically causing havoc to not only the civilized world, but to nature's flora species which serve as food for these insect species. One can imagine many scenarios if the flora and fauna populations of Earth becomes unbalanced, with one species becoming more dominant than another and nothing to keep a species population in check. But somehow nature has and will most likely always adapt to any type of negative change, even if it ultimately means extinction as a last resort.

Some Extinct Species Resulting Directly from <i>Homo Sapiens</i> Depredations	
Rocky Mountain locust	<p>The Rocky Mountain locust (<i>Melanoplus spretus</i>) is an extinct species of locust that ranged through the western half of the United States and some western portions of Canada until the end of the 19th century. Sightings often placed their swarms in numbers far larger than any other locust species, with one famous sighting in 1875 estimated at 198,000 square miles (510,000 km²) in size (greater than the area of California), weighing 27.5 million tons, and consisting of some 12.5 trillion insects – the greatest concentration of animals ever speculatively guessed, according to Guinness World Records.</p> <p>Rocky Mountain locusts had reportedly plagued farmers in California as early as 1722; they had caused farm damage in Maine in 1743–56 and Vermont in 1797–98. The locusts became more of a problem in the 19th century, as farming expanded westward into the grasshoppers' favored habitat: outbreaks of varying severity emerged in 1828, 1838, 1846, and 1855, affecting areas throughout the West. Plagues visited Minnesota in 1856–57 and again in 1865, and Nebraska suffered repeated infestations between 1856 and 1874.</p> <p>The last major swarms of Rocky Mountain locust were between 1873 and 1877, when the locust caused \$200 million in crop damage in Colorado, Kansas, Minnesota, Missouri, Nebraska, and other states. One farmer reported that the locusts seemed "like a great white cloud, like a snowstorm, blocking out the sun like vapor". The locusts ate not only the grass and valuable crops, but also leather, wood, sheep's wool, and in extreme cases, even clothes off peoples' backs. As the swarms got worse, farmers attempted to control them using gunpowder, fires (sometimes dug in trenches to burn as many of the locusts as possible), smearing them with "hopperdozers", even sucking them into vacuum cleaner-like contraptions, but all of these were ultimately ineffective in stopping the hordes. Charles Valentine Riley, a Missouri entomologist, came up with a recipe for locusts seasoned with salt and pepper and pan-fried in butter. The recipe sold, but some stated that they "would just as soon starve as eat those horrible creatures". Farmers finally responded in force to the swarm's destruction; an 1877 Nebraska law said that anyone between the ages of 16 and 60 had to work at least two days eliminating locusts at hatching time or face a \$10 fine. That same year Missouri offered a bounty of \$1 a bushel for locusts collected in March, 50 cents a bushel in April, a quarter in May and a dime in June. Other Great Plains states made similar bounty offers. In the 1880s farmers had recovered sufficiently from their locust woes to be able to send carloads of corn to flood victims in Ohio. They also switched to such resilient crops as winter wheat, which matured in the early summer, before locusts were able to migrate. These new agricultural practices effectively reduced the threat of locusts and greatly contributed to the species' downfall.</p> <p>The cause of their extinction is unknown. It has been hypothesized that plowing and irrigation by settlers in the Great Plains, particularly alongside the Mississippi river, disrupted their natural life cycle in the areas they lived in between swarms. For example, reports from this era suggest that farmers killed over 150 egg cases per square inch while plowing, harrowing or flooding. However, it appeared that this species lived and reproduced in the prairie only temporarily during swarming years, with each generation being smaller than the previous one and swarming ever further from the Rocky Mountains. Specificity of their life cycle during non-swarming years and natural habitat in the Rocky Mountains was never investigated, so the reason of their disappearance will likely remain uncertain.</p> <p>Because locusts are a form of grasshopper that appear when grasshopper populations reach high densities, it</p>

	<p>was theorized that <i>M. spretus</i> might not be extinct, that "solitary phase" individuals of a migratory grasshopper might be able to turn into the Rocky Mountain locust given the right conditions; however, breeding experiments using many grasshopper species in high-density environments failed to invoke the famous insect. Analysis of mitochondrial DNA from museum specimens and related species suggests that the Rocky Mountain locust was a distinct and now extinct species, possibly closely related to the Bruner spurthroat grasshopper (<i>Melanoplus bruneri</i>). The species was formally declared extinct by the IUCN in 2014.</p>
Pinta Island Tortoise	<p>In June 2012 Lonesome George the last known member of the species died. Many members of the species were hunted and eating by sailors during the 17th and 18th centuries which led to the collapse of the population. Lonesome George was found in 1971 and most sources state Lonesome George was more than 100 years old.</p>
Steller's sea cow	<p>Steller's sea cow (<i>Hydrodamalis gigas</i>) is an extinct sirenian discovered by Europeans in 1741. At that time, it was found only around the Commander Islands in the Bering Sea between Alaska and Russia. Steller's sea cow was quickly wiped out by fur traders, seal hunters, and others who followed Vitus Bering's route past its habitat to Alaska. It was also hunted to collect its valuable subcutaneous fat.</p>
Dodo Bird	<p>Inhabited Mauritius for thousands of years, the Dutch settled the region in 1598, by 1693 dodos were extinct as a result of hunting the easy to kill bird.</p>
Moa	<p>The moa were nine species (in six genera) of flightless birds endemic to New Zealand. The nine species of moa were the only wingless birds lacking even the vestigial wings which all other ratites have. They were the dominant herbivores in New Zealand's forest, shrubland and subalpine ecosystems for thousands of years, and until the arrival of the Māori were hunted only by the Haast's eagle. Moa extinction occurred around 1300 CE - 1440 CE ± 20 years, primarily due to overhunting by Māori.</p> <p>Before the arrival of human settlers, the moa's only predator was the massive Haast's eagle. New Zealand had been isolated for 80 million years and had few predators prior to human arrival, meaning that not only were its ecosystems extremely fragile but the native species were ill-equipped to cope with human predators.</p> <p>The Māori arrived sometime before CE 1300, and all moa genera were soon driven to extinction by hunting and, to a lesser extent, by habitat reduction due to forest clearance. By 1445, all moa had become extinct, along with the Haast's eagle which had relied on them for food. Recent research using carbon-14 dating of middens strongly suggests that the events leading to extinction took less than a hundred years, rather than a period of exploitation lasting several hundred years, which is what had previously been hypothesized.</p> <p>The earliest period of Māori settlement is known as the "Archaic", "Moahunter" or "Colonisation" period. The eastern Polynesian ancestors of the Māori arrived in a forested land with abundant birdlife, including several now extinct moa species weighing from 20 to 250 kilograms (40 to 550 lb). Other species, also now extinct, included a swan, a goose and the giant Haast's eagle, which preyed upon the moa. Marine mammals, in particular seals, thronged the coasts, with evidence of coastal colonies much further north than exist today. At the Waitaki River mouth, huge numbers of moa bones, estimated at 29,000 to 90,000 birds, have been located. Further south, at the Shag River mouth, at least 6,000 moa were slaughtered by humans over a relatively short period.</p>
Passenger Pigeon	<p>Once the most abundant bird in North America, with a population of 3 to 5 billion, it was a very fast bird flying up to 62 mph. Pigeon meat was commercialized as cheap food, resulting in hunting on a massive and industrial scale for many decades. Simultaneously, deforestation was practiced on a large scale, which led to habitat loss. These factors, combined with the fact that the species needed vast numbers to sustain itself, led to the extinction of the passenger pigeon. A slow decline between about 1800 and 1870 was followed by a rapid decline between 1870 and 1890. The last confirmed wild bird is thought to have been shot in 1900. Martha, thought to be the last passenger pigeon, died on September 1914, at the Cincinnati Zoo. A lesser known extinction that also resulted was that of the <i>Diplaegidia gladiator</i> or Passenger Pigeon Mite which lived in symbiosis with the Passenger Pigeon.</p>
Dusky Seaside Sparrow	<p>It went extinct in 1987 due to habitat encroachment and DDT being sprayed on the Florida salt water marsh it inhabited.</p>
Rockland Grass Skipper and Zestos Skipper Butterflies	<p>The rockland grass skipper vanished in 1999, and the Zestos skipper has not been spotted since 2004. Habitat loss and extensive insecticide spraying in urban areas to combat mosquitos have both been blamed.</p>
Xerces Blue Butterfly	<p>The Xerces blue (<i>Glaucopsyche xerces</i>) is an extinct species of butterfly in the gossamer-winged butterfly family, Lycaenidae. The species lived in coastal sand dunes of the Sunset District of San Francisco. The Xerces blue is believed to be the first American butterfly species to become extinct as a result of loss of habitat caused by urban development. The last Xerces blue was seen in the 1940's.</p>
Light-loving Noctuid Moth	<p>The Light-loving noctuid moth, <i>Agrotis photophila</i> was a species of moth in the Noctuidae family. It was endemic to O'ahu, Hawai'i, United States. This moth was last reported around 1900.</p>

Aurochs	The aurochs is an extinct type of large wild cattle that inhabited Europe, Asia, and North Africa. It is the ancestor of domestic cattle. Already in the times of Herodotus (fifth century BC), aurochs had disappeared from southern Greece, but remained common in the area north and east of Echedorus River close to modern Thessaloniki. Last reports of the species in the southern tip of the Balkans date to the first century BC when Varro reported that fierce wild oxen live in Dardania (southern Serbia) and Thrace. By the 13th century AD, the aurochs' range was restricted to Poland, Lithuania, Moldavia, Transylvania, and East Prussia. The right to hunt large animals on any land was restricted first to nobles, and then gradually, to only the royal households. As the population of aurochs declined, hunting ceased, and the royal court used gamekeepers to provide open fields for grazing for the aurochs. The gamekeepers were exempted from local taxes in exchange for their service. Poaching aurochs was punishable by death. According to a royal survey in 1564, the gamekeepers knew of 38 animals. The last recorded live aurochs, a female, died in 1627 in the Jaktorów Forest, Poland, from natural causes. The causes of extinction were unrestricted hunting, a narrowing of habitat due to the development of farming, and diseases transmitted by domesticated cattle.
California Grizzly Bear (<i>Ursus arctos californicus</i>)	Less than 75 years after the discovery of gold in 1848, almost every grizzly bear in California had been tracked down and killed. The last hunted California grizzly was shot in Tulare County, California, in August 1922. Later, in 1924, a grizzly known to roam an area of the Sierra Madre Mountains (Santa Barbara County) was spotted for the last time, and thereafter, grizzlies were never seen again in California
Atlas Wild Ass	The Atlas wild ass (<i>Equus africanus atlanticus</i>), also known as Algerian wild ass, is a purported extinct subspecies of the African wild ass that was once found across North Africa and parts of the Sahara. It was last represented in a villa mural ca.300 AD in Bona, Algeria, and became extinct as a result of Roman sport hunting.
Bali Tiger	The Bali tiger (<i>Panthera tigris balica</i>), harimau Bali in Indonesian, or samong in Balinese, is an extinct tiger subspecies that was native to the Indonesian island of Bali. It was the first tiger subspecies that became extinct in recent times. It was one of three subspecies of tigers found in Indonesia, together with the Javan tiger, which is also extinct, and the Critically Endangered Sumatran tiger. It was the smallest of the tiger subspecies. The last specimen definitely recorded was a female shot at Sumbar Kima, west Bali, on 27 September 1937. However, a few animals likely survived into the 1940s and possibly 1950s. The subspecies became extinct because of habitat loss and hunting. Given the small size of the island and limited forest cover, the original population could never have been large.
Black-Fronted Parakeet	Like its relative, the Society parakeet, the species inhabited woodlands, but as testified by the 1773 report of Georg Forster, they were able to persist in numbers despite widespread deforestation for agriculture and the presence of the small kiore rats and pigs, which undoubtedly preyed on the bird's eggs on occasion. The natives of Tahiti, who valued red parrot feathers for use in handicraft above all others, had to trade for these with the Samoans, as the black-fronted parakeet did not possess the desired feathers in sufficient quality and quantity. However, they liked to keep the species as pets. After the introduction of cats and European rats, the species rapidly succumbed to these predators.
Bernard's Wolf	The Victoria's Island population is believed to have died out in between 1918 and 1952. They were previously widespread in their native habitat but were annihilated by excessive hunting.
Bermuda Saw-Whet Owl	The Bermuda saw-whet owl (<i>Aegolius gradyi</i>) was a species of owl that was endemic to Bermuda. It was described from fossil records and explorer accounts of the bird in the 17th century. It is not known what caused its extinction, but it may have been related to the decline of cedar and palmetto trees, or the arrival of non-native predators and competitors after human colonization. In 2014, this owl was declared extinct
Carolina Parakeet	Though formerly prevalent within its range, the bird had become rare by the middle of the 19th century. The last confirmed sighting in the wild was of the ludovicianus subspecies in 1910. The last known specimen perished in captivity at Cincinnati Zoo in 1918 and the species was declared extinct in 1939. The evidence is rather conclusive that extinction of the Carolina parakeet was by anthropogenic activity, through a variety of means. Chief among them is deforestation in the 18th and 19th centuries. Hunting played a significant role, both for their colorful feathers used to adorn women's hats and to reduce predation on southern crops. This was partially offset by recognition of their value in controlling invasive cockleburrs. Minor roles were played by capture for the pet trade and, it was hypothesized, by the introduction for crop pollination of European honeybees that competed for nest sites. A factor that exacerbated their decline to extinction was the flocking behavior that led them to return to the vicinity of dead and dying birds (e.g., birds downed by hunting), enabling wholesale slaughter.
Quagga	The quagga is an extinct subspecies of plains zebra that lived in South Africa until the 19th century. They were once found in great numbers in the Karoo of Cape Province and the southern part of the Orange Free State in South Africa. After the Dutch settlement of South Africa began, the quagga was heavily hunted as it competed with domesticated animals for forage. While some individuals were taken to zoos in Europe, breeding programs were unsuccessful. The last wild population lived in the Orange Free State, and the quagga was extinct in the wild by 1878. The last captive specimen died in Amsterdam on 12 August 1883. Only one quagga was ever photographed alive and only 23 skins are preserved today.

Caspian Tiger	The demise of the Caspian tiger began with the Russian colonisation of Turkestan during the late 19th century. Their extirpation was caused by several factors: They were killed by large parties of sportsmen and military personnel who hunted wild pigs and tigers. The extensive reedbeds of tiger habitat were increasingly converted to cropland for planting cotton and other crops that grew well in the rich silt along rivers. The range of wild pigs underwent a rapid decline between the middle of the 19th century and the 1930s due to overhunting, natural disasters, and diseases such as swine fever and foot-and-mouth disease, which caused large and rapid die-offs. Tigers were already vulnerable due to the restricted nature of their distribution, having been confined to watercourses in large expanses of desert environment. Until the early 20th century, the regular Russian army was used to clear predators from forests, around settlements, and potential agricultural lands. Until World War I, about 100 tigers were killed in the forests of Amu-Darya and Piandj Rivers each year. High incentives were paid for tiger skins up to 1929.
Boulder Snail	The boulder snail (<i>Athearnia crassa</i>) was a species of freshwater snail in the family Pleuroceridae. It was native to the United States, where it was known from Alabama, Georgia, Tennessee, and Virginia. It is now extinct.
Bonin Wood Pigeon	The Bonin wood pigeon (<i>Columba versicolor</i>) was a pigeon endemic to Nakodo-jima and Chichi-jima in the Ogasawara Islands, south of Japan. It is known from four recorded specimens, the first from 1827 and the last from 1889. They averaged a length of 45 cm. This pigeon died out late in the 19th century as a result of deforestation, hunting, and predation by introduced rats and cats.
Big-Eared Hopping Mouse	Feral Cats had a catastrophic influence on the big-eared hopping mouse, as they targeted a number of larger rodents throughout Western Australia in the 1850s. The presence of these feral cats occurred before that of the Red Fox. Exotic disease held a severe to catastrophic position in contributing to the extinction of the big-eared hopping mouse. An epizootic disease had a heavy impact on a large number of mammal species in Western Australia, <i>notomys macrotis</i> included. This disease in conjunction with drought conditions and the presence of feral cats helped lead to the extinction of the big-eared hopping mouse. Habitat degradation, loss and fragmentation all had moderate to severe ratings for the extinction of this species. The big-eared hopping mouse lived in sand dune environments, the same of which were used in the 1800s for sheep herding, as well as mass land clearing. Both of these impacted the condition of the soils, grass, nutrients, leaves, and other organic materials in the mouse's habitat. The destruction of their burrows, resources, and food supply led to the extinction of this species
Huia Bird	The huia was the largest species of New Zealand wattlebird, endemic to the North Island of New Zealand. Its extinction in the early 20th century had two primary causes. The first was rampant overhunting to procure huia skins for mounted specimens, which were in worldwide demand by museums and wealthy private collectors. Huia were also hunted to obtain their long, striking tail feathers for locally fashionable hat decorations. The second major cause of extinction was the widespread deforestation of the lowlands of the North Island by European settlers to create pasture for agriculture. Most of these forests were ancient, ecologically complex primary forests, and huia were unable to survive in regenerating secondary forests. The last confirmed sighting of a huia was on 28 December 1907 in the Tararua Ranges. Further credible sightings near Wellington were reported until 1922, and in Te Urewera National Park in the early 1960s
Eastern Cougar	On June 17, 2015, the U.S. Fish and Wildlife Service removed the eastern puma from their endangered species list, declaring that the species is now extinct. According to the Center for Biological Diversity, "The eastern cougar was extinct well before it was protected under the Endangered Species Act, as was the case with eight of the other 10 species that have been delisted for extinction." The Florida Panther, a subspecies, still exists in small groups in southern Florida
Imperial Woodpecker	It was the world's largest woodpecker species, at 56–60 cm (22–23.5 in) long. The last confirmed record was from Durango in 1956, and the species is very likely now extinct. If they have gone extinct, it would have been due to habitat deconstruction and fragmentation combined with hunting. These factors are the reason why the species has not been seen in over 50 years, although there have been local reports of sightings. Researchers believe that their decline was also accelerated by active eradication campaigns conducted by logging interests, by over-hunting — for use in folk medicine, and because nestlings were considered a delicacy by the Tarahumara. It has been hunted for sport, food and for medicinal purposes over a long period of time, and feathers and bills were reportedly used in rituals by Tepheuana and Huichol tribes in the south of Durango. Additionally, imperial woodpeckers are stunning birds, and as the species became increasingly rare, many were apparently shot by people who had never encountered such a bird, and wanted to get a closer look.
Heath Hen	Owing to intense hunting pressure, the population declined rapidly. Perhaps as early as the 1840s, at any rate by 1870, all heath hens were extirpated on the mainland. There were about 300 left on the island of Martha's Vineyard, off Massachusetts, but by 1890 this number had declined to 120–200 birds, mainly due to predation by feral cats and poaching. By the late 19th century, there were about 70 left. These were protected by a hunting ban and by the establishment in 1908 of the "Heath Hen Reserve" (today the Manuel F. Correllus State Forest), and the population rapidly grew to almost 2000: by the mid-1910s, observing the birds on their lekking grounds had become something of a tourist attraction. However, a destructive fire during the 1916 nesting season, severe winters, an unusual influx of predatory goshawks, inbreeding, an excess number of male

	<p>individuals and apparently an epidemic of blackhead disease, which might have been transmitted by poultry, brought the numbers down quickly; after a last recovery to 600 in 1920, the population began its final decline. Heath hens were one of the first bird species that Americans tried to save from extinction. As early as 1791, a bill "for the preservation of heath-hen and other game" was introduced in the New York State legislature. Some representatives misinterpreted the bill when it was read as an act to protect "Indians and other heathen"; Although the legislation was passed, it turned out to be unenforceable. Although the effort to save the heath hen from extinction was ultimately unsuccessful, it paved the way for conservation of other species.</p>
Lake Pedder Earthworm	<p>The Lake Pedder Earthworm (<i>Hypolimnus pedderensis</i>) was an earthworm species in the family Megascolecidae. Its genus <i>Hypolimnus</i> is monotypic. It was endemic to the Lake Pedder area in Tasmania, Australia, prior to its flooding in 1972 for a hydro-electric power scheme. It is only known from a specimen collected from a Lake Pedder beach in 1971. A 1996 survey failed to find it and it is presumed extinct.</p>
Saddle-Backed Mauritius Giant Tortoise	<p>The tortoise species, like many island species, were reportedly friendly, curious and not afraid of humans. With the arrival of the Dutch, vast numbers of both tortoise species were slaughtered - either for food (for humans or pigs) or to be burned for fat and oil. In addition, they introduced invasive alien species such as rats, cats and pigs, which ate the tortoises' eggs and hatchlings. The species was likely extinct on the main island of Mauritius by about 1700, and on most of the surrounding islets by 1735.</p>
Sea Mink	<p>The sea mink was hunted to extinction to satisfy the demand of the European fur market. Fur traders made traps to catch the sea minks and also pursued them with dogs. Even before the European expansion, Native Americans would capture the animals for their pelts and flesh. A large contributing factor to the eventual extinction of the sea mink was the unregulated hunting and harvesting of these animals. Another possible contributing factor was the high mortality rate of the young. Ultimately, the sea mink became extinct sometime between 1860 and 1870.</p>
Syrian Elephant	<p>Skeletal remains of <i>E. m. asurus</i> have been recorded from the Middle East (Turkey, Iraq and Syria) from periods dating between 3 million years BC and 100 years BC. In Syria, the production of ivory items was at its maximum during the first millennium BC, when the Arameans made splendid ivory inlay for furniture. This overhunting of Syrian elephants for ivory ultimately resulted in their extinction by around 100 BC.</p>
Silver Trout	<p>The silver trout (<i>Salvelinus agassizii</i>) is an extinct char species or variety that inhabited a few waters in New Hampshire prior to 1939. By the late 19th century, as each lake developed its own steady summer tourism, recreational fishermen who sought to increase their catches began to introduce new fish species, and these eventually overwhelmed the native silver trout. Yellow perch, which eat trout eggs, and lake trout, which hold the same ecological niche, as well as eat and hybridize with other char species, were particularly devastating. Other species were also introduced that have proved to be devastating to native trout species in other waters, the rainbow trout, brown trout, Atlantic salmon, and rainbow smelt.</p>
Yunnan Lake Newt	<p>The Yunnan lake newt (<i>Cynops wolterstorffi</i>) is a species of newt in the Salamandridae family, and is also known as Wolterstorff's newt. It was only found near the Kunming Lake in Yunnan, China. It was found in shallow lake waters and adjacent freshwater habitats. Despite extensive surveys, it has not been seen since 1979, and is therefore considered extinct. The reasons for its extinction are believed to be habitat loss, pollution, and introduced species.</p>
Tobias' Caddisfly	<p>The Tobias' caddisfly (<i>Hydropsyche tobiasi</i>) was a caddisfly which lived on the River Rhine between Mainz and Cologne. It was last seen in 1938 and was described in 1977 by Austrian entomologist Hans Malicky on the basis of material he found in earlier collections. Very little is known about the species and no larvae were ever found. The River Rhine has been a subject to urban and industrial pollution for several decades during the 20th century. This had led to the decline and disappearance of many caddisfly species on several riversides of the Rhine.</p>
Thicktail Chub Fish	<p>The thicktail chub (<i>Gila crassicauda</i>) was a type of minnow that inhabited the lowlands and weedy backwaters of the Sacramento and San Joaquin Rivers in the Central Valley of California. It was once abundant in lowland lakes, marshes, ponds, slow-moving stretches of river, and, during years of heavy run-off, the surface waters of San Francisco Bay. The thicktail chub was one of the most common fish in California. Within native American middens it represents 40% of the fish.[3] The chub was a favored food of the native Indian peoples of Clear Lake and the Central Valley before being heavily exploited by commercial fishermen supplying the San Francisco market. The primary cause of the thicktailed chub's extinction was the conversion of much of the Central Valley to agricultural use. Most of its habitat was destroyed by the drainage of sloughs and marshes, dam-building, and water diversion for irrigation. All this resulted in the loss of the sluggish water the species preferred. Competition from exotic species also contributed to its extinction. The last known example was caught in the April 13, 1957.</p>
Paradise Parrot	<p>The reasons for the sudden decline of the paradise parrot remain speculative. Possibilities include overgrazing, land clearing, changed fire regimes, hunting by bird collectors, and predation by introduced mammals like cats and dogs. It became rare towards the end of the 19th century and was thought extinct by 1915. A series of searches turned up a few more individuals over the next decade, but the last confirmed sighting was on 14</p>

	September 1927.
Saudi Gazelle	The Saudi gazelle (<i>Gazella saudiya</i>) is an extinct species of gazelle once found in the Arabian peninsula. It is extinct due to hunting by humans in its native lands. The species was always rare and declining due to excessive hunting; it has not been seen for a few decades, and was declared to be extinct in the wild in 1980. Recent genetic analysis of all reported specimens of <i>G. saudiya</i> in captive collections has shown these represent different species or hybrids. Despite frequent surveys attempting to find pure Saudi gazelles in the wild and privately owned, no evidence of surviving individuals has been found. The Saudi gazelle was officially declared extinct by the IUCN in 2008.
Schomburgk's Deer	Commercial production of rice for export began in the late-19th century in Thailand, leading to the loss of nearly all grassland and swamp areas on which this deer depended. Intensive hunting pressure at the turn of the century restricted the species further until it became extinct. The wild population of Schomburgk's deer is thought to have died because of overhunting in 1932, with the last captive individual being killed in 1938.
Red-Bellied Gracile Opossum	The red-bellied gracile opossum (<i>Cryptonanus ignitus</i>) is an extinct species of opossum that was native to Jujuy Province, Argentina. Its forest habitat has been destroyed, and it was last seen in 1962.
Mexican Grizzly Bear	The Mexican grizzly bear was trapped, shot and poisoned, and had already become scarce in the 1930s. Its former range decreased to the three isolated mountains Cerro Campana, Cerro Santa Clara, and Sierra del Nido 80 km north of Chihuahua in the state of Chihuahua. By 1960 only 30 of them were left. Despite its protected status the hunting continued. By 1964 the Mexican grizzly bear was regarded as extinct. A grizzly was shot in 1976 in Sonora, the fourth confirmed in Sonora and the first in many decades. The Mexican grizzly is now presumed to be extinct.
Australian Mammals	Australia and its unique fauna have suffered an extreme decline in mammal species, 10% of its 273 terrestrial mammals, since European settlement (a loss of one to two species per decade); in contrast, only one species in North America has become extinct since European settlement. Furthermore, 21% of Australia's mammals are threatened, and unlike in most other continents, the main cause is predation by feral species, such as cats. Seven species of native Australian rodent have become extinct and several others have significantly declined in numbers since the settlement of Europeans in Australia.
Xerces Blue Butterfly	The Xerces blue (<i>Glaucopsyche xerces</i>) is an extinct species of butterfly in the gossamer-winged butterfly family, Lycaenidae. The species lived in coastal sand dunes of the Sunset District of San Francisco. The Xerces blue is believed to be the first American butterfly species to become extinct as a result of loss of habitat caused by urban development. The last Xerces blue was seen in the early 1940's.
Carolina Parakeet	The Carolina parakeet (<i>Conuropsis carolinensis</i>) or Carolina conure was a small green neotropical parrot with a bright yellow head, reddish orange face and pale beak native to the eastern, midwest and plains states of the United States and was the only indigenous parrot within its range. It was found from southern New York and Wisconsin to Kentucky, Tennessee and the Gulf of Mexico, from the Atlantic seaboard to as far west as eastern Colorado. It lived in old-growth forests along rivers and in swamps. Though formerly prevalent within its range, the bird had become rare by the middle of the 19th century. The last confirmed sighting in the wild was of the ludovicianus subspecies in 1910. The last known specimen perished in captivity at the Cincinnati Zoo in 1918. The evidence is rather conclusive that extinction of the Carolina parakeet was by anthropogenic activity, through a variety of means. Chief among them is deforestation in the 18th and 19th centuries. Hunting played a significant role, both for their colorful feathers used to adorn women's hats and to reduce predation on southern crops. This was partially offset by recognition of their value in controlling invasive cockleburrs. Minor roles were played by capture for the pet trade and, it was hypothesized, by the introduction for crop pollination of European honeybees that competed for nest sites.
Imperial woodpecker	The last confirmed record was from Durango in 1956, and the species is very likely now extinct. If they have gone extinct, it would have been due to habitat deconstruction and fragmentation combined with hunting. These factors are the reason why the species has not been seen in over 50 years, although there have been local reports of sightings. Researchers believe that their decline was also accelerated by active eradication campaigns conducted by logging interests, by over-hunting — for use in folk medicine, and because nestlings were considered a delicacy by the Tarahumara. It has been hunted for sport, food and for medicinal purposes over a long period of time, and feathers and bills were reportedly used in rituals by Tepheuana and Huichol tribes in the south of Durango. Additionally, imperial woodpeckers are stunning birds, and as the species became increasingly rare, many were apparently shot by people who had never encountered such a bird, and wanted to get a closer look. Field research by Tim Gallagher and Martjan Lammertink, reported in Gallagher's 2013 book, found evidence — in the form of accounts by elderly residents in the bird's range, who saw imperial woodpeckers decades earlier, and who discussed their recollections with the researchers — that foresters working with Mexican logging companies in the 1950s told the local people that the woodpeckers were destroying valuable timber, and encouraged the people to kill the birds. As part of this campaign, the foresters gave the local residents poison to smear on trees that the birds foraged on. Because groups of imperial woodpeckers tended to feed on a single huge, dead, old-growth pine tree for as long as two weeks, applying poison to such a tree would be an effective way to wipe out a group of up to a dozen of these huge

	<p>woodpeckers — and, perhaps, even to kill off succeeding groups of the birds that might move into the area, and be attracted to the same tree. Gallagher suspects that such a campaign of poisoning may be the key to the species' apparent catastrophic population crash in the 1950s, which has hitherto lacked a satisfactory explanation. A campaign of poisoning could well have killed whole groups of the bird in a short time. The premise of protecting valuable timber from the woodpeckers was, in fact, baseless. Imperial woodpeckers do not forage on, or excavate nest or roosting holes in live, healthy trees.</p>
Pyrenean ibex	<p>The Pyrenean ibex was one of four subspecies of the Iberian ibex. The first to become extinct was the Portuguese ibex (<i>Capra pyrenaica lusitanica</i>) in 1892. The Pyrenean ibex was the second, with the last individual, a female called Celia, found dead in 2000. In the Middle Ages, Pyrenean ibex were very abundant in the Pyrenees region, but decreased rapidly in the 19th and 20th centuries due to hunting pressure. In the second half of the 20th century, only a small population survived in the Ordesa National Park situated in the Spanish Central Pyrenees. Competition with domestic and wild ungulates also contributed to the extinction of the Pyrenean ibex. Much of its range was shared with sheep, domestic goats, cattle, and horses, especially in summer when it was in the high mountain pastures. This led to interspecific competition and overgrazing, which particularly affected the ibex in dry years. In addition, the introduction of non-native wild ungulate species in areas occupied by the ibex (e.g. fallow deer and mouflon in the Sierras de Cazorla, Segura y Las Villas Natural Park) increased the grazing pressure, as well as the risk of transmission of both native and exotic diseases.</p>
Hula bream	<p><i>Acanthobrama hulensis</i>, sometimes known as the Hula bream, was a species of ray-finned fish in the Cyprinidae family. Its natural habitats were swamps and freshwater lakes in Lake Hula in northern Israel. <i>Acanthobrama hulensis</i> looked much like a sardine. In Israel other members of the genus often are called "sardin" in culinary terms. The deliberate draining of Lake Hula in the 1950s led to the extinction of this species, along with the cichlid fish <i>Tristramella intermedia</i>. The Israel painted frog was believed to be extinct until a female specimen was found in 2011. <i>Acanthobrama hulensis</i> was last recorded in 1975.</p>
Caribbean monk seal	<p>The Caribbean monk seal, West Indian seal or sea wolf (as early explorers referred to it), <i>Neomonachus tropicalis</i>, was a species of seal native to the Caribbean and is now believed to be extinct. The Caribbean monk seals' main predators were sharks and humans. Overhunting of the seals for oil, and overfishing of their food sources, are the established reasons for the seals' extinction. The last confirmed sighting of the Caribbean Monk Seal was in 1952 at Serranilla Bank, between Jamaica and Nicaragua. In 2008, the species was officially declared extinct in the United States after an exhaustive search for the seals which lasted for about five years. This analysis was conducted by the National Oceanic and Atmospheric Administration and the National Marine Fisheries Service. Caribbean monk seals were closely related to the Hawaiian monk seals, which live around the Hawaiian Islands and are now endangered, and Mediterranean monk seals, another endangered species</p>
Baiji dolphin	<p>The baiji is a functionally extinct species of freshwater dolphin formerly found only in the Yangtze River in China. The baiji population declined drastically in decades as China industrialized and made heavy use of the river for fishing, transportation, and hydroelectricity. It has been credibly claimed, after surveys in the Yangtze River during the 1980s, that baiji could be the first dolphin species in history that humans have driven to extinction. A Conservation Action Plan for Cetaceans of the Yangtze River was approved by the Chinese Government in 2001. Efforts were made to conserve the species, but a late 2006 expedition failed to find any baiji in the river. Organizers declared the baiji functionally extinct. The baiji represents the first documented global extinction of a "megafaunal" vertebrate for over 50 years since the demise of the Japanese sea lion and the Caribbean monk seal in the 1950s. It also signified the disappearance of an entire mammal family of river dolphins (Lipotidae). The baiji's extinction would be the first recorded extinction of a well-studied cetacean species (it is unclear if some previously extinct varieties were species or subspecies) to be directly attributable to human influence.</p>
Western black rhinoceros	<p>The western black rhinoceros (<i>Diceros bicornis longipes</i>) or West African black rhinoceros was a subspecies of the black rhinoceros, declared extinct by the IUCN in 2011. The western black rhinoceros was believed to have been genetically different from other rhino subspecies. It was once widespread in the savanna of sub-Saharan Africa, but its numbers declined due to poaching. The western black rhinoceros was heavily hunted in the beginning of the 20th century, but the population rose in the 1930s after preservation actions were taken. As protection efforts declined over the years, so did the number of western black rhinos. By 1980 the population was in the hundreds. No animals are known to be held in captivity, however it was believed in 1988 that approximately 20–30 were being kept for breeding purposes. Poaching continued and by 2000 only an estimated 10 survived. In 2001, this number dwindled to only five. While it was believed that around thirty still existed in 2004, this was later found to be based upon falsified data.</p> <p>The western black rhino emerged about 7 to 8 million years ago. It was a sub-species of the black rhino. For much of the 1900s, its population was the highest out of all the rhino species at almost 850,000 individuals. There was a 96% population decline in black rhinos, including the western black rhino, between 1970 and 1992. Widespread poaching is concluded to be partly responsible for bringing the species close to extinction, along with farmers killing rhinos to defend their crops in areas close to rhino territories, and trophy hunting. By 1995 the number of western black rhinos had dropped to 2,500 individuals. The sub-species was declared</p>

	officially extinct in 2011, with its last sighting reported in 2006 in Cameroon's Northern Province.
	In 2006, for six months, the NGO Symbiose and veterinarians Isabelle and Jean-François Lagrot with their local teams examined the common roaming ground of <i>Diceros bicornis longipes</i> in the northern province of Cameroon to assess the status of the last population of the western black rhino subspecies. For this experiment, 2500 km of patrol effort resulted in no sign of rhino presence over the course of six months. The teams had concluded that the rhino was extinct approximately five years before it was officially declared so by the IUCN.
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Endangered and Threatened Species

The 2016 Living Planet Index, which measures biodiversity in 14,152 monitored populations of 3,706 vertebrate species, reported that on average the monitored species population abundance declined 58% between 1970 and 2012. (512) In December 2016, at the 13th Conference of the Parties to the Convention on Biological Diversity (CBD COP13) in Cancun, Mexico, the latest IUCN Red List was released which evaluated 85,604 flora and fauna species, of which analysts believe 24,307 are threatened with extinction. Populations of several wild species of faunae have plummeted over the last 50 years as a result of anthropogenic activities. In 1985, there were an estimated 151,702 to 163,452 giraffes in the wild, by 2015 the number had declined to 97,562. (515) In 1973, there were an estimated 288,500 Bornean orangutans, in 2004 there were an estimated 55,000. (521) Due to habitat loss and herbicide use, especially on milkweed, the North American monarch butterfly population has fallen dramatically. An estimated 970,000,000 monarch butterflies have vanished since 1990, with only an estimated 30,000,000 remaining as of 2015. (155) In 1960, there were estimated 100,000 black rhinos in Africa, after being poached for its horns, skins, and other body parts, there were less than 5,000 remaining in 2017. (563) In March 2017, poachers broke into the Thoiry zoo and wildlife park near Paris, killed a white rhinoceros, and then sawed off its horn. (135) Between 1999 and 2015 an estimated 100,000 Bornean orangutans were lost as a result of deforestation and hunting. (120)

In 2016, two conservation icons, the humpback whale and the panda, were removed from the endangered species list. These two species alone have received more media attention, conservation focus, and monetary assistance while so many other flora and fauna species that also needed help have since gone extinct or are on the brink of extinction during this same timeframe. Will the removal of the humpback whale and the panda perhaps convince some that everything is better now environmentally, and that conservation is no longer a priority because the two main conservation problems the world has been focused on now appear to have been solved?

Some Endangered and Threatened Species	
Species	Description
Asiatic cheetah	<p>The Asiatic cheetah (<i>Acinonyx jubatus venaticus</i>), also known as Iranian cheetah is a Critically Endangered cheetah subspecies surviving today only in Iran. It once occurred from the Arabian Peninsula and the Near East to the Kyzylkum Desert, Caspian region, Pakistan and India, but has been extirpated there during the 20th century. The Asiatic cheetah has been listed as Critically Endangered on the IUCN Red List since 1996. Following the Iranian Revolution of 1979, wildlife conservation was interrupted for several years. Manoeuvres with armed vehicles were carried in steppes, and local people hunted cheetahs and prey species unchecked. The gazelle population declined in many areas, and cheetahs retreated to remote mountainous habitats.</p> <p>Reduced gazelle numbers, persecution, land-use change, habitat degradation and fragmentation, and desertification contributed to the decline of the cheetah population. The cheetah is affected by loss of prey as a result of antelope hunting and overgrazing from introduced livestock. Its prey was pushed out as herders entered game reserves with their herds. A herder pursued a female cheetah with two cubs on his motorbike, until one of the cubs was so exhausted that it collapsed. He caught and kept it chained in his home for two weeks, until it was rescued by officers of the Iranian Department of Environment.</p> <p>Mining development and road construction near reserves also threaten the population. Coal, copper, and iron have been mined in cheetah habitat in three different regions in central and eastern Iran. It is estimated that the two regions for coal (Nayband) and iron (Bafq) have the largest cheetah population outside protected areas. Mining itself is not a direct threat to the population; road construction and the resulting traffic have made the cheetah accessible to humans, including poachers. The Iranian border regions to Afghanistan and Pakistan, viz the Baluchistan Province, are major passages for armed outlaws and opium smugglers who are active in the central and western regions of Iran, and pass through cheetah habitat. Uncontrolled hunting throughout the desert cannot be effectively</p>

	<p>controlled by the governments of the three countries.</p> <p>Conflict between livestock herders and cheetahs is also threatening the population outside protected areas. Several herders killed cheetahs to prevent livestock loss, or for trophies, trade and fun. Some herders are accompanied by large mastiff-type dogs into protected areas. These dogs killed five cheetahs between 2013 and 2016.</p> <p>Between 2007 and 2011, six cheetahs, 13 predators and 12 Persian gazelles died in Yazd Province following collisions with vehicles on a transit road. At least 11 Asiatic cheetahs were killed in road accidents between 2001 and 2014. The road network in Iran constitutes a very high risk for the small population as it impedes connectivity between population units. Efforts to stop the construction of a road through the core of the Bafq Protected Area were unsuccessful. In 2017 fewer than 50 were thought to remain in the wild.</p>
Pangolin	<p>The pangolin trade is centuries old. An early known example is in 1820, when Francis Rawdon, 1st Marquis of Hastings and East India Company Governor General in Bengal, presented King George III with a coat and helmet made with the scales of <i>Manis crassicaudata</i>. The gifts are now stored in the Royal Armouries in Leeds. The Convention on International Trade in Endangered Species (CITES), which regulates the international wildlife trade, added the eight known species of pangolin to its appendices in 1975. Despite restrictions on trade in place since 1975, enforcement is not uniformly strong. Most efforts have focused on curbing the supply side of the trade, but demand remains high and there is a thriving black market. Pangolins are believed to be the world's most trafficked mammal, accounting for as much as 20% of all illegal wildlife trade. In 2014, the Worldwatch Institute reported that more pangolins were seized than any other animal in Asia's wildlife black market. Estimates place the number of pangolins poached each year at between 10,000 and 100,000. The International Union for Conservation of Nature (IUCN) estimates that more than a million pangolins were poached in the decade prior to 2014. Most are sent to China and Vietnam, where their meat is prized and scales used for medicinal purposes. African and Asian nations frequently report on noteworthy confiscations of pangolins and pangolin parts. When a Chinese boat ran into a coral reef in the Philippines in 2013, officials discovered it to be carrying 10 tonnes of frozen pangolins.</p>
California condor	<p>In modern times, a wide variety of causes have contributed to the condor's decline. Its low clutch size (one young per nest), combined with a late age of sexual maturity, make the bird vulnerable to artificial population decline. Significant past damage to the condor population has also been attributed to poaching, especially for museum specimens, lead poisoning (from eating animals containing lead shot), DDT poisoning, electric power lines, egg collecting, and habitat destruction. During the California Gold Rush, some condors were even kept as pets. The leading cause of mortality in nestling condors is the ingestion of trash that is fed to them by their parents. In addition to this, cattle ranchers who observed condors feeding on the dead young of their cattle assumed that the birds killed the cattle. This fallacy led to the condor's extirpation in some parts of the western United States. This belief was so deeply ingrained that the reintroduction of condors to the Grand Canyon was challenged by some cattle ranchers, who mistakenly believed that the bird hunted calves and lambs. Unanticipated deaths among recent condor populations occurred due to contact with golden eagles, lead poisoning, and other factors such as power line collisions. Since 1994, captive-bred California condors have been trained to avoid power lines and people. Since the implementation of this aversion conditioning program, the number of condor deaths due to power lines has greatly decreased. Lead poisoning due to fragmented lead bullets in large game waste is a particularly big problem for condors due to their extremely strong digestive juices; lead waste is not as much of a problem for other avian scavengers such as the turkey vulture and common raven. This problem has been addressed in California by the Ridley-Tree Condor Preservation Act, a bill that went into effect July 1, 2008 that requires that hunters use non-lead bullets when hunting in the condor's range. Blood lead levels in golden eagles as well as turkey vultures has declined with the implementation of the Ridley-Tree Condor Preservation Act, demonstrating that the legislation has helped reduce other species' lead exposures aside from the California condor. There is no comparable anti-lead-bullet legislation in the other states in which the condor currently resides.</p> <p>In an article titled: "Condors or lead ammunition? We can't have both" published by The Ecologist in January 2015, author Dawn Starin states: "Over 60% of the adult and juvenile deaths (that is, excluding chicks and fledglings) in the wild population have been as a result of lead poisoning." She continues: "Because condors have been known to live past the age of 50, do not breed until they are at least six years old, and raise only one chick every other year, their populations cannot withstand the mortality rates caused by this neurological toxin." According to epidemiologist Terra Kelly: "Until all natural food sources are free from lead-based ammunition, lead poisoning will threaten recovery of naturally sustaining populations of condors in the wild." The article also states: "The military doesn't use lead, and if that isn't a huge message I don't know what is."</p>
Florida bonneted bat	<p>The Florida bonneted bat (<i>Eumops floridanus</i>) is a species of bat in the genus <i>Eumops</i>, the bonneted bats or mastiff bats. It is endemic to southern Florida in the United States. This species has one of the smallest geographical distributions of any New World bat. It has been called "one of the most critically endangered mammal species in North America". It is protected under the Endangered Species Act. The Florida bonneted bat was once believed to be common along Florida's eastern coast. Observations of it declined in the 1960s and 1970s, and in 1980, it was believed to be extinct. Threats to this species include the present and future degradation of its habitat, its small population size, restricted range, small number of colonies, low fecundity, and relative isolation. Climate change and resulting sea-level rise is expected to result in further loss of its roosting and foraging habitat.</p>
Desert tortoises	<p>The desert tortoises (<i>Gopherus agassizii</i> and <i>Gopherus morafkai</i>) are two species of tortoise native to the Mojave and Sonoran Deserts of the southwestern United States and northwestern Mexico and the Sinaloa thornscrub of</p>

	<p>northwestern Mexico. <i>G. agassizii</i> is distributed in western Arizona, southeastern California, southern Nevada, and southwestern Utah.</p> <p>Ravens, Gila monsters, kit foxes, badgers, roadrunners, coyotes, and fire ants are all natural predators of the desert tortoise. They prey on eggs, juveniles, which are 2–3 inches long with a thin, delicate shell, or, in some cases, adults. Ravens are thought to cause significant levels of juvenile tortoise predation in some areas of the Mojave Desert – frequently near urbanized areas. The most significant threats to tortoises include urbanization, disease, habitat destruction and fragmentation, illegal collection and vandalism by humans, and habitat conversion from invasive plant species (<i>Brassica tournefortii</i>, <i>Bromus rubens</i> and <i>Erodium</i> spp.).</p> <p>Desert tortoise populations in some areas have declined by as much as 90% since the 1980s, and the Mojave population is listed as threatened. It is unlawful to touch, harm, harass, or collect wild desert tortoises. It is, however, possible to adopt captive tortoises through the Tortoise Adoption Program in Arizona, Utah Division of Wildlife Resources Desert Tortoise Adoption Program in Utah, Joshua Tree Tortoise Rescue Project in California, or through Bureau of Land Management in Nevada. When adopted in Nevada, they will have a computer chip embedded on their backs for reference. According to Arizona Game and Fish Commission Rule R12-4-407 A.1, they may be possessed if the tortoises are obtained from a captive source which is properly documented. Commission Order 43: Reptile Notes 3: one tortoise per family member.</p> <p>The Fort Irwin National Training Center of the US Army expanded into an area that was habitat for about 2,000 desert tortoises, and contained critical desert tortoise habitat (a designation by the US Fish and Wildlife Service). In March 2008, about 650 tortoises were moved by helicopter and vehicle, up to 35 km away.</p> <p>Another potential threat to the desert tortoise's habitat is a series of proposed wind and solar farms.[16] As a result of legislation, solar energy companies have been making plans for huge projects in the desert regions of Arizona, California, Colorado, New Mexico, Nevada, and Utah. The requests submitted to the Bureau of Land Management total nearly 1,800,000 acres (7,300 km²).</p>
Roloway monkey	<p>The roloway monkey (<i>Cercopithecus roloway</i>) is an endangered species of Old World monkey endemic to tropical West Africa. It was previously considered a subspecies of the Diana monkey (<i>C. diana</i>). It is classified as Endangered due to habitat loss and continued hunting for the bushmeat trade.</p> <p>The roloway monkey has been classified as Endangered by the IUCN due to rapid population declines over the last few decades (50%-80%+), mostly driven by habitat loss and hunting. This species is among the most threatened primates on the African continent, although exact figures for the species are not available. Recent surveys could not find evidence of it in Ghana's Bia National Park, where it was probably eliminated between the mid-1970s and 1990.</p> <p>The old-growth forest habitat required by the species continues to be reduced by large-scale deforestation through logging and agricultural conversion. In addition to predation by natural enemies such as crowned eagles, leopards, and chimpanzees, roloway monkeys are also frequent targets of human hunting for the bushmeat trade. Over 800 tons of bushmeat is sold in Ghana's markets every year. The roloway monkeys' conspicuous colours and loud calls make them very susceptible to hunting. Their habitat is also becoming increasingly fragmented due to a decline in forest habitats and deforestation as human settlements expand and farming increases. In the past 100 years, Ghana has lost 80% of its forested lands. The species is listed as one of "The World's 25 Most Endangered Primates".</p>
Franklin's bumblebee	<p>Franklin's bumblebee (<i>Bombus franklini</i>) is known to be one of the most narrowly distributed bumblebee species, making it a critically endangered bee of the western United States. It is known only from a 190-by-70-mile (310 by 110 km) area in southern Oregon and northern California, between the Coast and Sierra-Cascade mountain ranges. It was also abundant in southwest Washington. It was last seen in 2006. Franklin's bumblebee is known to collect and nectar pollen from several wildflowers, such as lupine, California poppy, and horsemint, which causes it to be classified as a generalist forager.</p> <p>The last sighting of this bumblebee species was in Oregon in 2006. Some sources say this species is already extinct, but until more concrete evidence is shown, it has been assigned a conservation status rank of G1, which is critically imperiled. Furthermore, the population decreased drastically since 1998.</p>
Chinese bahaba	<p>The Chinese bahaba (<i>Bahaba taipingensis</i>) is a species of marine fish in the family Sciaenidae. It is a large fish, reaching lengths up to 2 m (6 ft 7 in) and weights in excess of 100 kg (220 lb); it is found on the coast of China, from the Yangtze River estuary southwards to the Pearl River estuary, including the waters of Hong Kong and Macau. Its natural habitats are shallow seas, subtidal aquatic beds, rocky shores, and estuarine waters.</p> <p>The Chinese bahaba was first described by Albert William Herre in 1932, when it was new to Western science. Annual catches of 50 tonnes were taken in the 1930s, but this had dwindled to 10 tonnes per year by the 1950s and 1960s when few large fish were caught.</p> <p>The Chinese bahaba is threatened by overfishing that continues despite legal protection in the mainland China (but not in Hong Kong); it has been listed as critically endangered by the International Union for Conservation of</p>

	<p>Nature. The fishing is prompted by the value placed on the swim bladders of this fish for use in traditional Chinese medicine. In some markets, notably the Chinese markets, a good specimen swim bladder fetches more than its weight in gold. Degradation of its estuarine spawning habitats may also have contributed to its decline.</p>
Madagascan pochard	<p>The Madagascan pochard or Madagascar pochard (<i>Aythya innotata</i>; Malagasy: Fotsy maso, Onjo[2]) is an extremely rare diving duck of the genus <i>Aythya</i>. Before it was rediscovered in 2006, the last confirmed sighting of the species was at Lake Alaotra on the Central Plateau of Madagascar in 1991. The single male then encountered was captured and kept in the Antananarivo Botanical Gardens until it died one year later. Intensive searches and publicity campaigns in 1989–1990, 1993–1994 and 2000–2001 failed to produce any more records of this bird.</p> <p>However, a flock of nine adults and four recently hatched ducklings were discovered at Lake Matsaborimena, in a remote area of northern Madagascar, in November 2006. The species was placed in the new "Possibly Extinct" category in the 2006 IUCN Red List; following the rediscovery, its old status of Critically Endangered was restored in the 2007 issue. As of 2008, only 25 adult birds had been counted in the wild.</p> <p>In 2009, a rescue plan involving the Durrell Wildlife Conservation Trust and the Wildfowl and Wetlands Trust removed a batch of ready-to-hatch eggs from a lake-side nest and incubated them in a lab that was set up in a tent beside the lake. After hatching, the day-old chicks were taken to a holding facility in a local hotel. Reared in captivity, they hatched eighteen ducklings in April 2012 at the captive breeding centre in Antsohihy, bringing the total population to 60. In April 2013, the population reached 80. In Autumn 2017 the population reached 90, the Wildfowl and Wetlands Trust and the Durrell Wildlife Conservation Trust are now ready to begin the reintroduction process at a suitable lake in Madagascar, Lake Sofia.</p>
Angonoka tortoise	<p>The angonoka tortoise (<i>Astrochelys yniphora</i>) is a critically endangered species of tortoise endemic to Madagascar. It is also known as the angonoka, ploughshare tortoise, Madagascar tortoise, or Madagascar angulated tortoise. This species is one of the rarest land tortoises in the world, classified as Critically Endangered on the IUCN Red List. The principal threats to the species are believed to be fires started to clear land for cattle grazing, and collection for the pet trade. The tortoise has a restricted distribution, likely a result of past collection for food, the expansion of agriculture, and accompanying fires. An additional threat is predation by the bushpig. Fires made to clear land can get out of control, turning into wildfires, which cut back more of the angonoka tortoise's habitat. Following efforts to create firebreaks through controlled fires in savanna fringes by conservation groups, out-of-control fires have decreased, until less than 50 ha (120 acres) of its habitat were burnt in 2004.</p> <p>The angonoka tortoise is often captured to be sold in the international pet trade. Though some enforcement of restrictions on illegal trade is successful, including the confiscation of the illegally obtained tortoises, they remain in incredibly high demand for the global pet trade. This is a major threat to the tortoises remaining in the wild. Conservationists mark the shells with identifying marks which mars the most attractive feature and make them less desirable to poachers and wealthy collectors. The engraving is a last-ditch effort to protect the animals.</p> <p>In addition to its Red List listing, the angonoka tortoise is now protected under the national law of Madagascar and listed on CITES Appendix I, commercial trade in wild-caught specimens is illegal (permitted only in exceptional licensed circumstances). For the conservation of the angonoka tortoise, the Durrell Wildlife Conservation Trust created Project Angonoka in 1986. The Water and Forests Department, the Durrell Trust, and the World Wide Fund for Nature work together on this project. A captive-breeding facility was established for this species in Madagascar in 1986 by the Jersey Wildlife Preservation Trust (now the Durrell Trust) in collaboration with the Water and Forests Department. In May 1996, 75 tortoises were stolen from the facility. The thieves were never found, but 33 tortoises later appeared for sale in the Netherlands. The project ultimately was a success, achieving 224 captive-bred juveniles out of 17 adults in December 2004. After the 1990s, Project Angonoka started ecological research on the tortoise and the development of conservation plans that involved the communities surrounding the habitat. The work with the community involved local people in making firebreaks, along with the creation of a park proposed by the community to protect the tortoise and the forests. Monitoring of the angonoka tortoise in the global pet trade has continued to be advocated.</p> <p>In March 2013, smugglers were arrested after carrying a single bag containing 54 angonoka tortoises and 21 radiated tortoises (<i>Astrochelys radiata</i>) through Suvarnabhumi International Airport in Thailand. The 54 angonoka tortoises might be as much as a tenth of the world's population of the species. On 20 March 2016, the Custom officials at Mumbai airport seized 146 tortoises from a mishandled baggage of a Nepal citizen. This bag was said to belong to a transit passenger, who arrived from Madagascar and flew to Kathmandu leaving this bag behind. Out of the 146 tortoises, 139 were radiated tortoises (<i>Astrochelys radiata</i>) and seven were angonoka tortoises (<i>Astrochelys yniphora</i>), both critically endangered tortoise species of Madagascar. Two radiated tortoises were found dead with broken shell. On 12 June 2016, it was reported that 6 angonoka tortoises and 72 radiated tortoises had gone missing from a breeding facility in Thailand.</p>
Sumatran rhinoceros	<p>Sumatran rhinoceroses were once quite numerous throughout Southeast Asia. Fewer than 100 individuals are now estimated to remain. The species is classed as critically endangered (primarily due to illegal poaching) while the last survey in 2008 estimated that around 250 individuals survived. From the early 1990s, the population decline was estimated at more than 50% per decade, and the small, scattered populations now face high risks of inbreeding depression. Most remaining habitat is in relatively inaccessible mountainous areas of Indonesia.</p>

	<p>Poaching of Sumatran rhinoceros is a cause for concern, as the price of its horn has been estimated as high as US\$30,000 per kilogram. This species has been overhunted for many centuries, leading to the current greatly reduced – and still declining – population. The rhinos are difficult to observe and hunt directly (one field researcher spent seven weeks in a treehide near a salt lick without ever observing a rhino directly), so poachers make use of spear traps and pit traps. In the 1970s, uses of the rhinoceros's body parts among the local people of Sumatra were documented, such as the use of rhino horns in amulets and a folk belief that the horns offer some protection against poison. Dried rhinoceros meat was used as medicine for diarrhea, leprosy, and tuberculosis. "Rhino oil", a concoction made from leaving a rhino's skull in coconut oil for several weeks, may be used to treat skin diseases. The extent of use and belief in these practices is not known. Rhinoceros horn was once believed to be widely used as an aphrodisiac; in fact traditional Chinese medicine never used it for this purpose. Nevertheless, hunting in this species has primarily been driven by a demand for rhino horns with supposedly medicinal properties.</p> <p>The rainforests of Indonesia and Malaysia, which the Sumatran rhino inhabits, are also targets for legal and illegal logging because of the desirability of their hardwoods. Rare woods such as merbau, meranti and semaram are valuable on the international markets, fetching as much as \$1,800 per m³ (\$1,375 per cu yd). Enforcement of illegal-logging laws is difficult because humans live within or near many of the same forests as the rhino. The 2004 Indian Ocean earthquake has been used to justify new logging. Although the hardwoods in the rainforests of the Sumatran rhino are destined for international markets and not widely used in domestic construction, the number of logging permits for these woods has increased dramatically because of the tsunami. However, while this species has been suggested to be highly sensitive to habitat disturbance, apparently it is of little importance compared to hunting, as it can withstand more or less any forest condition. Nevertheless, the main cause of drastic reduction of the species is likely caused by the Allee effect.</p> <p>The Bornean rhino in Sabah was confirmed to be extinct in the wild in April 2015, with only 3 individuals left in captivity. The mainland Sumatran rhino in Malaysia was confirmed to be extinct in the wild in August 2015. In March 2016 there was a rare sighting of a Sumatran Rhino in Kalimantan, the Indonesian part of Borneo. The last time there was a Sumatran Rhino in the Kalimantan area was approximately 40 years ago. This optimism was met with despair as that very specific Sumatran Rhino was found dead several weeks later after the sighting. The reason of the death is currently unknown.</p>
Hula painted frog	<p>The Hula painted frog (<i>Latonia nigriventer</i>) is an amphibian and the only living member of the genus <i>Latonia</i>. It was thought to be extinct as a result of habitat destruction during the 1950s until the species was rediscovered in 2011. It is endemic to the Lake Hula marshes in Israel. The draining of Lake Hula and its marshes in the 1950s was thought to have caused the extinction of this frog, along with the cyprinid fish <i>Acanthobrama hulensis</i> and cichlid fish <i>Tristramella intermedia</i>. Only five individuals had been found prior to the draining of the lake. Environmental improvements in the Hula reserve have been cited as a possible reason for the frog's reemergence.</p> <p>In 1996, the IUCN classified this species as "extinct in the wild", the very first amphibian to be given that designation by the IUCN. Israel continued to list it as an endangered species in the slim hope that a relict population may be found in the Golan Heights or in southern Lebanon. Following the rediscovery of the species in 2011, the IUCN now considers the frog to be critically endangered as its known habitat occupies less than 2 km².</p> <p>In 2000, a scientist from the Lebanese nature protection organisation A Rocha claimed he had seen a frog species which could be <i>Latonia nigriventer</i> in the Aammqi Wetland south of the Beqaa Valley in Lebanon. Two French-Lebanese-British expeditions in the years 2004 and 2005 yielded no confirmation as to the further existence of this species. In August 2010, a search organised by the Amphibian Specialist Group of the International Union for Conservation of Nature set out to look for various species of frogs thought to be extinct in the wild, including the Hula painted frog.</p> <p>In 2013, a study published in <i>Nature Communications</i> revealed that in 2011 during a routine patrol at the Hula Nature Reserve, ranger Yoram Malka found the frog, which he immediately suspected as being the Hula painted frog, as he claimed he has been on the lookout for it for many years. Scientists confirmed that it was one of this rare species. An ecologist with the Israel Nature and Parks Authority credited the rehydration of the area for the frog sighting. On November 29, a second specimen was located in the same area. The second Hula painted frog, a female, was found in swampy weeds twenty centimeters deep. It weighed 13 grams, half the weight of its male counterpart. Since the discovery of the first specimen, at least ten more individuals have been found, all in the same area. In 2016, a team led by Professor Sarig Gafni of the Ruppin Academic Center's School of Marine Sciences discovered populations totaling several hundred individuals by searching in water at night, instead of in marsh mud, finding populations in 17 of the 52 Hula Valley water holes they surveyed.</p>
Northern white rhinoceros	<p>The northern white rhinoceros, or northern square-lipped rhinoceros (<i>Ceratotherium simum cottoni</i>), is one of the two subspecies of the white rhinoceros (the other being the southern white rhinoceros). Formerly found in several countries in East and Central Africa south of the Sahara, it is extremely rare and listed as critically endangered. This subspecies is a grazer in grasslands and savanna woodlands. Poachers reduced their population from 500 to 15 in the 1970s and 1980s. From the early 1990s through mid-2003, the population recovered to more than 32 animals. Since mid-2003, poaching has intensified and further reduced the wild population. At the beginning of 2015, the</p>

	fully captive northern white rhino population consisted of only two animals maintained in two zoological institutions: in the United States (San Diego Zoo Safari Park) and the Czech Republic (Dvůr Králové Zoo). However, both of them died later the same year, and no zoo in the world has any northern white rhinos any longer. As of 2017, there are only three rhinos of this subspecies left with only one being male and unable to reproduce due to advanced age. They live in the Ol Pejeta Conservancy in Kenya and are protected round-the-clock by armed guards. According to the latest International Union for Conservation of Nature (IUCN) assessment from 2011, the subspecies is considered "Critically Endangered (Possibly Extinct in the Wild).
Elaeocarpus bojeri	Elaeocarpus bojeri, also known under the common name bois dentelle (lit.: wood lace, descriptive of its delicate white flowers) is a species of flowering plant in the Elaeocarpaceae family, growing to a height of 3 m. It flowers from July to September. The species is found only in Mauritius, where fewer than 10 individuals are known to exist at Ganga Talao. It is not threatened because it is itself exploited, but because its environment is being overrun by more commercially attractive alien species such as Guava and Litsea monopetala.
Chinese crested tern	The Chinese crested tern (Thalasseus bernsteini) is a tern in the family Laridae, closely related to the Sandwich tern, T. sandvicensis, and the lesser crested tern, T. bengalensis. It is a critically endangered species, previously thought extinct, with a mere four pairs rediscovered in 2000, nesting in a greater crested tern colony on an islet in the Matsu Islands (territory governed by Taiwan), just off the coast of Fujian Province, China, and wintering south to the Philippines. In the past, it had a wider distribution off the Chinese east coast north to Shandong Province. The decline is thought to be due to past hunting and egg collection for food. Past protection of this colony may be because of the islands' disputed status, administered by Taiwan but claimed by mainland China, the military sensitivity of the area restricting access. The islet has now been declared a wildlife sanctuary. It is possible that other small colonies may yet be found off the Chinese and Taiwanese coasts; migrant birds have been seen near the mouth of the Pachang River. The total population is speculated to be less than 50 birds. In 2017, for the first time, Chinese crested terns were found breeding in South Korea. Setting up a new colony in such a faraway area would prove a boon for the species.
Tonkin snub-nosed monkey	<p>The Tonkin snub-nosed monkey or Dollman's snub-nosed monkey (Rhinopithecus avunculus) is a slender-bodied arboreal Old World monkey, endemic to northern Vietnam. It is a black and white monkey with a pink nose and lips and blue patches round the eyes. Habitat loss and hunting are some of the major causes for declines of naturally occurring populations of non-human primates, including the Tonkin Snub-nosed monkey. Decades of expanding human population and increasing demands for scarce agriculturally viable lands have led to the loss and fragmentation of the monkey's habitats. However, habitats of known Tonkin snub-nosed monkey populations were long lost and fragmented prior to their rediscovery. A pioneering study in 1993, in Na Hang Nature Reserve, obtained a population count of 72 individuals (estimated 80), and a subsequent study at the same site in 2005 obtained a population count of 17 individuals (estimated 22). Evidenced by both primary and secondary data, the population decline within that 13-year period can only be attributed to hunting activities.</p> <p>Sightings of the monkey have become increasingly rare. The primate was thought to be extinct until the 1990s, when a small population was discovered in Na Hang District in Tuyên Quang Province of Vietnam. Heavy poaching for food as well as the wildlife black market and the destruction of habitat are the main reasons why the Tonkin snub-nosed monkey is considered one of the planet's most critically endangered primate species . By 2008, when a small population with three infants was discovered in a remote forest, fewer than 250 of the primates were thought to exist. In December 2013, Fauna & Flora international released the result of a population survey conducted between September and October of that year in the Khau Ca Species and Habitat Conservation Area, Ha Giang province, Vietnam. The survey identified between 108-113 individuals alive in the conservation zone, nearly half of the standing estimate for world population and the highest number at the site since populations began to be monitored. Researchers took this as an encouraging sign that conservation efforts were making an impact on the species' steeply declining numbers. The latest survey, as of November 2017, carried out by Fauna & Flora international in Khau Ca forest in April 2017 recorded at least 113-121 individuals making this area home to the largest known population of Tonkin snub-nosed monkey (Nguyen Van Truong, 2017).</p>
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Invasive Florae and Faunae

Invasive species can disrupt the natural balance to an ecosystem which has been created over millions of years, by potentially feeding on native and sometimes endemic florae and faunae, and by invading the habitat area invasive species can limit the available space for native florae and faunae. Invasive species can also result in the extirpation and even extinction of some native flora and fauna species. A prime example of this is the invasive rose-ringed parakeet which has taken over a park in Seville, Spain where the largest colony of greater noctule bats in Europe inhabit. A study found that between 2003 and 2017 the number of park trees used by the native bats fell by 81%. Researchers also observed the parakeets chasing the bats out of their nests and found dead bats with wounds from parakeet beaks. (82)

Some invasive species are feral faunae like pigs, donkeys, snakes, lizards, fish, or other domesticated faunae that

have either escaped captivity or been released intentionally. In many cities around the world, exotic pets have been released by pet owners who no longer want the fauna and want to set it free, or by owners that want to intentionally alter an ecosystem. Piranhas now swim in the Mississippi river and the Great Lakes, parrots fly around Los Angeles and Madrid, iguanas, Nile monitors, pythons, and rhesus macaques inhabit the Florida swamps, and boa constrictors live in some city sewers. Since the 1950s, repeated introductions have led to thousands of peafowl now inhabiting some 20 counties in Florida. Attempts have been made to eradicate some invasive species, but usually the invasive species is so established these futile efforts do more harm to the ecosystem with toxic chemicals, or by introducing further invasive species. Since the migrations of *Homo sapiens* began more than 2,000,000 years ago, thousands of non-native flora and fauna species have been introduced into ecosystems throughout the world, some intentionally and others by accident.

As a result of direct and indirect anthropogenic actions, invasive species have invaded nearly every ecosystem in the world. A 2005 study estimated that there are more than 120,000 alien flora, fauna, and microbe species which have invaded natural ecosystems in the United States, United Kingdom, Australia, South Africa, India and Brazil, with more than 50,000 alien species introduced into the United States alone. The study also estimated, that almost 500,000 alien species have been introduced into modified ecosystems globally. (641) Many of these species were introduced purposefully by *Homo sapiens* for agriculture, hunting, or aesthetics. And while they may have benefited *Homo sapiens*, many have had negative impacts on ecosystems and even led to the extinction of native flora and fauna species, some even endemic. Many invasive species were intentionally introduced into an ecosystem as a result of *Homo sapiens* failed attempts to play God and influence the ecosystem in one way or another, like the introduction of 310,000,000 non-native and native fish in Yellowstone between 1881 and 1955, and the stripping of 818,000,000 eggs from Yellowstone trout between 1889 and 1956 to be shipped to other locations throughout the United States. (572) Other invasive species have been introduced by accident being hitchhikers transported through agriculture, livestock, or other anthropogenic activities.

If given time nature will balance itself out without any intervention by *Homo sapiens*. A prime example of this was in January 2010, for nearly two weeks the temperatures in South Florida ranged between 30 and 40 degrees, resulting in a substantial portion of the invasive iguana and python populations dying from the cold weather. Similar freezes happened in the 2008 and 2018 winters as well also leading to iguana and python mortality. Could some type of biobullet or other technology help to eradicate invasive species? What side-effects could this biobullet have on other native flora and fauna species? Do biological control agents, like the introduction of more invasive species, truly help to eradicate or even mitigate the invasive species, or only compound the problem?

Some Invasive Species	
Red fox	Red foxes pose a serious conservation problem in Australia. Current estimates indicate that there are more than 6.2 million red fox (<i>Vulpes vulpes</i>) and growing with a range extending throughout most of the continental mainland. The species became established in Australia through successive introductions by settlers in 1830s. Due to its rapid spread and ecological impact it has classified as one of the most damaging invasive species in Australia.
Rat	When introduced into locations where rats previously did not exist they can cause a huge amount of environmental degradation. <i>Rattus rattus</i> , the black rat, is considered to be one of the world's worst invasive species. Also known as the ship rat, it has been carried worldwide as a stowaway on sea-going vessels for millennia and has usually accompanied men to any new area visited or settled by human beings by sea. The similar but less aggressive species <i>Rattus norvegicus</i> , the brown rat or wharf rat, has also been carried worldwide by ships in recent centuries. The ship or wharf rat has contributed to the extinction of many species of wildlife including birds, small mammals, reptiles, invertebrates, and plants, especially on islands. True rats are omnivorous and capable of eating a wide range of plant and animal foods. True rats have a very high birth rate. When introduced to a new area, they quickly reproduce to take advantage of the new food supply. In particular, they prey on the eggs and young of forest birds, which on isolated islands often have no other predators and thus have no fear of predators. Some experts believe that rats are to blame for between 40 percent and 60 percent of all seabird and reptile extinctions, with 90 percent of those occurring on islands. Thus man has indirectly caused the extinction of many species by accidentally introducing rats to new areas.
Gypsy moth	<i>Lymantria dispar dispar</i> , commonly known as the gypsy moth, European gypsy moth, or North American gypsy moth, is a moth in the family <i>Erebidae</i> that is of Eurasian origin. It has a range which covers Europe, Africa, and

	<p>North America. It is classified as a pest, and its larvae consume the leaves of over 500 species of trees, shrubs and plants. The gypsy moth is one of the most destructive pests of hardwood trees in the eastern United States. It is listed as one of the 100 most destructive invasive species worldwide.</p> <p>The gypsy moth (<i>Lymantria dispar</i>) was introduced in 1868 into the United States by Étienne Léopold Trouvelot, a French scientist living in Medford, Massachusetts. Because native silk-spinning caterpillars were susceptible to disease, Trouvelot imported the species in order to breed a more resistant hybrid species. Some of the moths escaped, found suitable habitat, and began breeding. The gypsy moth is now a major pest of hardwood trees in the eastern United States.</p> <p>The first US outbreak occurred in 1889, and by 1987, the gypsy moth had established itself throughout the northeast US, southern Quebec, and Ontario. The insect has now spread into Michigan, Minnesota, Virginia, West Virginia, Illinois, and Wisconsin. Small, isolated infestations have sporadically occurred in Utah, Oregon, Washington, California, and British Columbia, but efforts have been taken to eradicate them. Since 1980, the gypsy moth has defoliated over one million acres (4,000 km²) of forest each year. In 1981, 12.9 million acres (52,200 km²) were defoliated. In wooded suburban areas, during periods of infestation, gypsy moth larvae crawl over man-made obstacles and sometimes enter homes. When feeding, they leave behind a mixture of small pieces of leaves and frass, or excrement. During outbreaks, the sound of moths chewing and dropping frass may be loud enough to sound like light to moderate rainfall. Gypsy moth populations usually remain low, but occasional increases to very high levels can result in partial or total defoliation of host trees.</p>
Asian carp	<p>Nine Asian carp species have been substantially introduced outside of their native ranges. As invasive species Asian carp are an invasive species. Some species of Asian carp cause harm when they are introduced to new environments. The black carp feeds on native mussels and snails, some of which can be already endangered. Grass carp can alter the food webs of a new environment by altering the communities of plants, invertebrates, and fish. Silver carp feed on the plankton necessary for larval fish and native mussels. The common carp was brought to the U.S. in 1831 and has been widespread for a long time. In the late 19th century, it was distributed widely throughout the United States by the United States Fish Commission as a foodfish.</p>
Tumbleweed	<p>In the family Amaranthaceae (s.l., including Chenopodiaceae), several annual species of the genus <i>Kali</i> are the most notorious tumbleweeds. They are thought to be native to Eurasia, but when their seeds entered North America in shipments of agricultural seeds, they became naturalized in large areas. They have been so successful that in the cinema genre of Westerns, they have long been symbols of frontier areas. <i>Salsola tragus</i> is the so-called "Russian thistle". It is an annual plant that breaks off at the stem base when it dies, and forms a tumbleweed, dispersing its seeds as the wind rolls it along. It is said to have arrived in the United States in shipments of flax seeds to South Dakota, perhaps about 1870. It now is a noxious weed throughout North America, dominating disturbed habitats such as roadsides, cultivated fields, eroded slopes, and arid regions with sparse vegetation. Among the Amaranthaceae (s.s.) that form tumbleweeds, there are several species of <i>Amaranthus</i>, such as <i>Amaranthus albus</i>, native to Central America but invasive in Europe, Asia, and Australia; and <i>Amaranthus graecizans</i>, native to Africa, but naturalized in North America. <i>Amaranthus retroflexus</i>, which is indigenous to tropical North and South America, has become nearly cosmopolitan largely as a weed, but like many other species of <i>Amaranthus</i>, it also is widely valued as animal forage and as human food, though it should be utilised with caution to avoid toxicity.</p>
Myxobolus cerebralis	<p><i>Myxobolus cerebralis</i> is a myxosporean parasite of salmonids (salmon, trout, and their allies) that causes whirling disease in farmed salmon and trout and also in wild fish populations. It was first described in rainbow trout in Germany a century ago, but its range has spread and it has appeared in most of Europe (including Russia), the United States, South Africa, Canada, and other countries. In the 1980s, <i>M. cerebralis</i> was found to require a tubificid oligochaete (a kind of segmented worm) to complete its life cycle. The parasite infects its hosts with its cells after piercing them with polar filaments ejected from nematocyst-like capsules.</p> <p>Whirling disease afflicts juvenile fish (fingerlings and fry) and causes skeletal deformation and neurological damage. Fish "whirl" forward in an awkward, corkscrew-like pattern instead of swimming normally, find feeding difficult, and are more vulnerable to predators. The mortality rate is high for fingerlings, up to 90% of infected populations, and those that do survive are deformed by the parasites residing in their cartilage and bone. They act as a reservoir for the parasite, which is released into water following the fish's death.</p> <p><i>Myxobolus cerebralis</i> which is a myxosporean parasite of salmonids e.g. salmon, trout, etc., was originally endemic to central Europe, but <i>M. cerebralis</i> has now been introduced throughout the world usually via infected trout imported from Europe, it has since been reported in Germany (1893), Italy (1954), USSR (1955), including Sakhalin Island (1960), USA (1956), Bulgaria (1960), Yugoslavia (1960), Sweden (1966), South Africa (1966), Scotland (1968), New Zealand (1971), Ecuador (1971), Norway (1971), Colombia (1972), Lebanon (1973), Ireland (1974), Spain (1981) and England (1981).</p> <p>Although originally a mild pathogen of <i>Salmo trutta</i> in central Europe and other salmonids in northeast Asia, the introduction of the rainbow trout (<i>Oncorhynchus mykiss</i>) has greatly increased the impact of this parasite. Having no innate immunity to <i>M. cerebralis</i>, rainbow trout are particularly susceptible, and can release so many spores that</p>

	<p>even more resistant species in the same area, such as <i>S. trutta</i>, can become overloaded with parasites and incur 80%–90% mortalities. Where <i>M. cerebralis</i> has become well-established, it has caused decline or even elimination of whole cohorts of fish.</p> <p>The impact of <i>M. cerebralis</i> in Europe is somewhat lessened because the species is endemic to this region, giving native fish stocks a degree of immunity. Rainbow trout, the most susceptible species to this parasite, are not native to Europe; successfully reproducing feral populations are rare, so few wild rainbow trout are young enough to be susceptible to infection. On the other hand, they are widely reared for restocking sport-fishing waters and for aquaculture, where this parasite has its greatest impact. Hatching and rearing methods designed to prevent infection of rainbow trout fry have proved successful in Europe. These techniques include hatching eggs in spore-free water and rearing fry to the "ossification" stage in tanks or raceways. These methods give particular attention to the quality of water sources to guard against spore introduction during water exchanges. Fry are moved to earthen ponds only once they are considered to be clinically resistant to the parasite, after skeletal ossification occurs.</p> <p><i>M. cerebralis</i> was first found in New Zealand in 1971. The parasite has only been found in rivers in the South Island, away from the most important aquaculture sites. Additionally, salmonid species commercially aquacultured in New Zealand have low susceptibility to whirling disease, and the parasite has also not been shown to affect native salmonids. An important indirect effect of the parasites presence is quarantine restriction placed on exports of salmon products to Australia.</p> <p><i>M. cerebralis</i> was first recorded in North America in 1956 in Pennsylvania, having been introduced via infected trout imported from Europe, and has spread steadily south and westwards. Until the 1990s, whirling disease was considered a manageable problem affecting rainbow trout in hatcheries. However, it has recently become established in natural waters of the Rocky Mountain states (Colorado, Wyoming, Utah, Montana, Idaho, New Mexico), where it is causing heavy mortalities in several sportfishing rivers. Some streams in the western United States have lost 90% of their trout. In addition, whirling disease threatens recreational fishing, which is important for the tourism industry, a key component of the economies of some U.S. western states. For example, "the Montana Whirling Disease Task Force estimated trout fishing generated US \$300,000,000 in recreational expenditures in Montana alone". Making matters worse, some of the fish species that <i>M. cerebralis</i> infects (bull trout, cutthroat trout, and steelhead) are already threatened or endangered, and the parasite could worsen their already precarious situations. For reasons that are poorly understood, but probably have to do with environmental conditions, the impact on infected fish has been greatest in Colorado and Montana, and least in California, Michigan, and New York. In August 2016 after tens of thousands of fish died, Montana wildlife officials closed 183 miles of the Yellowstone River in addition to hundreds of miles of other linked waterways in an attempt to halt the spread of an outbreak of <i>M. cerebralis</i>.</p> <p>Whirling disease was first detected in fish in Johnson Lake in Banff National Park in May, 2016. CFIA Labs confirmed in August and Parks Canada announced the outbreak August 23, 2016. Although it was first discovered in Banff, it is not necessarily where the disease originated and spread. The Government of Alberta is currently sampling and testing fish in 6 different watersheds (Peace River, Athabasca, North Saskatchewan, Red Deer, Bow and Oldman) to see where the disease has spread. Initial sample fish were collected in 2016, and are currently being processed by the Government of Alberta and CFIA labs. Since testing began, it has been detected in the Upper Bow River, and in May 2017 it was confirmed that whirling disease had also been detected in the Oldman River Basin. The declaration does not mean that every susceptible finfish population within the Bow and Oldman River watersheds are infected with the disease.</p>
Water hyacinth	<p><i>Eichhornia crassipes</i>, commonly known as (common) water hyacinth, is an aquatic plant native to the Amazon basin, and is often a highly problematic invasive species outside its native range. Water hyacinth has been widely introduced in North America, Europe, Asia, Australia, Africa and New Zealand. In many areas it has become an important and pernicious invasive species. In New Zealand it is listed on the National Pest Plant Accord which prevents it from being propagated, distributed or sold. In large water areas such as Louisiana, the Kerala Backwaters in India, Tonlé Sap in Cambodia and Lake Victoria it has become a serious pest. The common water hyacinth has become an invasive plant species on Lake Victoria in Africa after it was introduced into the area in the 1980s.</p> <p>When not controlled, water hyacinth will cover lakes and ponds entirely; this dramatically affects water flow, blocks sunlight from reaching native aquatic plants, and starves the oxygen of water, often killing fish (or turtles). The plants also create a prime habitat for mosquitos, the classic vectors of disease, and a species of snail known to host a parasitic flatworm which causes schistosomiasis (snail fever). Directly blamed for starving subsistence farmers in Papua New Guinea, water hyacinth remains a major problem where effective control programs are not in place. Water hyacinth is often problematic in man-made ponds if uncontrolled, but can also provide a food source for goldfish, keep water clean and help to provide oxygen to man-made ponds. Water hyacinth often invades bodies of water that have already been affected by human activities. For example, the plants can unbalance natural lifecycles in artificial reservoirs or in eutrophied lakes that receive large amounts of nutrients.</p>

	<p>Because of <i>E. crassipes</i> invasiveness, several biological control agents have been released to control it, including two weevils (Coleoptera: Curculionidae), <i>Neochetina bruchi</i> Hustache and <i>Neochetina eichhorniae</i> Warner, and the moth <i>Niphograpta alboguttalis</i> (Warren) (Lepidoptera: Pyralidae). <i>Neochetina eichhorniae</i> causes "a substantial reduction in water hyacinth production" (in Louisiana); it reduces plant height, weight, root length, and makes the plant produce fewer daughter plants. <i>N. eichhorniae</i> was introduced from Argentina to Florida in 1972. A semi-aquatic grasshopper, <i>Cornops aquaticum</i>, is being investigated in South Africa as an additional control agent.</p> <p>The water hyacinth was introduced in 1884 at the World's Fair in New Orleans, also known as the World Cotton Centennial. The plants had been given away as a gift by a group of visiting Japanese. Soon after, the water hyacinth was choking rivers, killing fish and stopping shipping in Louisiana, and an estimated 50 kg/m² choked Florida's waterways. There were many attempts to eradicate the flower, including one by the U.S. War Department to pour oil over many of the flowers, but none worked. In 1910, a bold solution was put forth by the New Foods Society. Their plan was to import and release hippopotamus from Africa into the rivers and bayous of Louisiana. The hippopotamus would then eat the water hyacinth and also produce meat to solve another serious problem at the time, the American meat crisis.</p> <p>Known as the American Hippo bill, H.R. 23621 was introduced by Louisiana Congressman Robert Broussard and debated by the Agricultural Committee of the U.S. House of Representatives. The chief collaborators in the New Foods Society and proponents of Broussard's bill were Major Frederick Russell Burnham, the celebrated American scout, and Captain Fritz Duquesne, a South African scout who later became a notorious spy for Germany. Presenting before the Agricultural Committee, Burnham made the point that none of the animals that Americans ate, chickens, pigs, cows, sheep, lambs, were native to the U.S., all had been imported by European settlers centuries before, so why should Americans hesitate to introduce hippopotamus and other large animals into the American diet? Duquesne, who was born and raised in South Africa, further noted that European settlers on that continent commonly included hippopotamus, ostrich, antelope, and other African wildlife in their diets and suffered no ill effects. The American Hippo bill nearly passed, but fell one vote short.</p>
Red imported fire ant	<p>The red imported fire ant is native to South America but it has been accidentally introduced in Australia, New Zealand, several Asian and Caribbean countries and the United States. Red imported fire ants are among the worst invasive species in the world. However, some scientists would consider the red imported fire ant to be a "disturbance specialist"; this is because human disturbance to the environment may be a major factor behind the ants' impact (fire ants tend to favour disturbed areas). This is shown through one experiment, demonstrating that mowing and plowing in studied areas almost diminished the diversity and abundance of native ant species, whereas red imported fire ants found on undisturbed forest plots had only diminished a couple of species.</p> <p>In the United States, the red imported fire ant first arrived in the seaport of Mobile, Alabama by cargo ship between 1933 and 1945. Arriving with an estimated 9 to 20 unrelated queens, The red imported fire ant was only rare at the time, as entomologists were unable to collect any specimens. The earliest observations of these ants were by E.O. Wilson in 1942, and the population expansion most likely occurred after 1937; the population of these ants exploded by the 1950s. Since its introduction to the United States, the red imported fire ant has spread throughout the southern states and the north-east of Mexico, negatively affecting wildlife and causing economic damage. The expansion of red imported fire ants may be limited since they are almost wiped out during Tennessee winters, and thus they may be reaching their northernmost range. However, global warming may allow the red imported fire ant to expand its geographical range. As of 2004, the ant is found in 13 states and occupies over 128 million hectares of land, and as many as 400 mounds can be found on a single acre of land. The United States Department of Agriculture estimates that they expand 193 kilometres (120 miles) per year. Populations found outside North America originate from the United States. In 2011, the DNA of specimens from Australia, China and Taiwan was analysed with results showing that they are related to those in the United States.</p>
Dutch elm disease	<p>Dutch elm disease (DED) is caused by a member of the sac fungi (Ascomycota) affecting elm trees, and is spread by elm bark beetles. Although believed to be originally native to Asia, the disease was accidentally introduced into America and Europe, where it has devastated native populations of elms that did not have resistance to the disease. It has also reached New Zealand.</p> <p>Dutch elm disease was first noticed in continental Europe in 1910, and spread slowly, reaching Britain in 1927 and eventually extending to all other countries in Europe except Greece and Finland. This first strain was a relatively mild one, which killed only a small proportion of elms, more often just killing a few branches, and had largely died out by 1940 owing to its susceptibility to viruses. The disease was isolated in The Netherlands in 1921 by Bea Schwarz, a pioneering Dutch phytopathologist, and this discovery would lend the disease its name. Circa 1967, a new, far more virulent strain arrived in Britain on a shipment of rock elm <i>U. thomasii</i> logs from North America, and this strain proved both highly contagious and lethal to European elms; more than 25 million trees have died in the UK alone, while France has lost over 90% of her elms.[13] The disease is still migrating northwards through Scotland, reaching Edinburgh in the late 1970s, and Inverness in 2006. By 1990, very few mature elms were left in Britain or much of continental Europe.</p>

	<p>The disease was first reported in the United States in 1928, with the beetles believed to have arrived in a shipment of logs from The Netherlands destined for use as veneer in the Ohio furniture industry. Quarantine and sanitation procedures held most cases within 150 miles of metropolitan New York City until 1941 when war demands began to curtail them. The disease spread from New England westward and southward, almost completely destroying the famous elms in the "Elm City" of New Haven, Connecticut, reaching the Detroit area in 1950, the Chicago area by 1960, and Minneapolis by 1970. Of the estimated 77 million elms in North America in 1930, over 75% had been lost by 1989.</p>
Cane toad	<p>The cane toad in Australia is regarded as an exemplary case of a "feral species"—others being rabbits, foxes, cats and dogs. Australia's relative isolation prior to European colonisation and the industrial revolution—both of which dramatically increased traffic and importation of novel species—allowed development of a complex, interdependent system of ecology, but one which provided no natural predators for many of the species subsequently introduced. The recent, sudden inundation of foreign species has led to severe breakdowns in Australian ecology, after overwhelming proliferation of a number of introduced species for which the continent has no efficient natural predator or parasite, and which displace native species—in some cases these species are physically destructive to habitat as well. Cane toads have been very successful as an invasive species, having become established in more than 15 countries within the past 150 years.</p> <p>Native to South and mainland Middle America, cane toads were introduced to Australia from Hawaii in June 1935 by the Bureau of Sugar Experiment Stations, now the Sugar Research Australia, in an attempt to control the native grey-backed cane beetle (<i>Dermolepida albohirtum</i>) and Frenchi beetle (<i>Lepidiota frenchi</i>). These beetles are native to Australia and they are detrimental to sugar cane crops, which are a major source of income for Australia. Adult cane beetles eat the crop's leaves, but the main problem is the larvae, which feed on the roots. Adult cane beetles have a heavy exoskeleton and their eggs and larva are often buried underground, making them difficult to exterminate. Furthermore, conventional methods of pest control, such as pesticide use, would eradicate harmless species of insects as well, making it an unsatisfactory method. Cane toads were to replace the use of pesticides like arsenic, pitch and copper. The success of using the moth <i>Cactoblastis cactorum</i> in controlling prickly pears in Australia also contributed to hopes for the cane toad.</p> <p>The long-term effects of toads on the Australian environment are difficult to determine, however some effects include "the depletion of native species that die eating cane toads; the poisoning of pets and humans; depletion of native fauna preyed on by cane toads; and reduced prey populations for native insectivores, such as skinks." Precipitous declines in populations of the northern quoll (<i>Dasyurus hallucatus</i>) have been observed after toads have invaded an area. There are a number of reports of declines in goanna and snake populations after the arrival of toads. For example, local populations of <i>Varanus panoptes</i> dropped by up to 90% when their habitat was invaded by cane toads.</p>
Coypu	<p>The coypu, also known as the river rat or nutria, is a large, omnivorous, semiaquatic rodent. Originally native to subtropical and temperate South America, it has since been introduced to North America, Europe, Asia, and Africa, primarily by fur ranchers. Although it is still valued for its fur in some regions, its destructive feeding and burrowing behaviors make this invasive species a pest throughout most of its range. According to the U.S. Geological Survey, nutria were first introduced the United States in California, in 1899. They were first brought to Louisiana in the early 1930s for the fur industry, and the population was kept in check, or at a small population size, because of trapping pressure from the fur traders. The earliest account of nutria spreading freely into Louisiana wetlands from their enclosures was in the early 1940s; a hurricane hit the Louisiana coast for which many people were unprepared, and the storm destroyed the enclosures, enabling the nutria to escape into the wild. According to the Louisiana Department of Wildlife and Fisheries, nutria were also transplanted from Port Arthur, Texas, to the Mississippi River in 1941 and then spread due to a hurricane later that year. Under the Coastwide Nutria Control Program, which also receives funds from CWPPRA, 308,160 nutria were harvested the first year (2002–2003), revealing 82,080 acres damaged and totaling \$1,232,640 in incentive payments paid out to those legally participating in the program. Essentially, once a person receives a license to hunt or trap nutria, then that person is able to capture an unlimited number. When a nutria is captured, the tail is cut off and turned in to a Coastal Environments Inc. official at an approved site. Each nutria tail is worth \$5, which is an increase from \$4 before the 2006-2007 season. Nutria harvesting increased drastically during the 2009-2010 year, with 445,963 nutria tails turned in worth \$2,229,815 in incentive payments.</p>
Barbary sheep	<p>The Barbary sheep (<i>Ammotragus lervia</i>) is a species of caprid (goat-antelope) native to rocky mountains in North Africa. Six subspecies have been described. Although it is rare in its native North Africa, it has been introduced to North America, southern Europe, and elsewhere. It is also known as aoudad, waddan, arui, and arruis. Barbary sheep have been introduced to southeastern Spain, the southwestern United States (Chinati Mountains on La Escalera Ranch, Guadalupe Mountains National Park, Palo Duro Canyon, the Trans-Pecos, and other parts of Texas, New Mexico, and California), Niihau Island (Hawaii), Mexico, and some parts of Africa.</p> <p>They have become common in a limited region of south-eastern Spain, since its introduction in 1970 to Sierra Espuña [Regional park] as a game species. Its adaptability enabled it to colonise nearby areas quickly, and private game estates provided other centers of dispersion. The species is currently expanding, according to recent field</p>

	<p>surveys, now being found in the provinces of Alicante, Almería, Granada, and Murcia. This species is a potential competitor to native ungulates inhabiting the Iberian Peninsula. The species has also been introduced to La Palma (Canary Islands), and has spread throughout the northern and central parts of the island, where it is a serious threat to endemic vegetation.</p>
Zebra mussel	<p>The native distribution of the species is in the Black Sea and Caspian Sea in Eurasia. Zebra mussels have become an invasive species in North America, Great Britain, Ireland, Italy, Spain, and Sweden. They disrupt the ecosystems by monotypic colonization, and damage harbors and waterways, ships and boats, and water treatment and power plants. Water treatment plants are most affected because the water intakes bring the microscopic free-swimming larvae directly into the facilities. Zebra mussels also cling to pipes under the water and clog them.</p> <p>Grossinger reported it in Hungary in 1794. Kerney and Morton described the rapid colonization of Britain by the zebra mussel, first in Cambridgeshire in the 1820s, London in 1824, and in the Union Canal near Edinburgh in 1834. In 1827, zebra mussels were seen in the Netherlands at Rotterdam. Canals that artificially link many European waterways facilitated their early dispersal. It is nonindigenous in the Czech Republic in Elbe River in Bohemia since 1893; in southern Moravia, it is probably native.[19] Around 1920 the mussels reached Lake Mälaren in Sweden.</p> <p>The first appearance of the organism in northern Italy was in Lake Garda in 1973; in central Italy, they appeared in Tuscany in 2003. Zebra mussels are also present in British waterways. Many water companies are reporting having problems with their water treatment plants with the mussels attaching themselves to pipeworks. Anglian Water has estimated that it costs £500,000 per year to remove the mussels from their treatment plants. It has been argued that zebra mussels also have had an effect on fish populations, with dwindling fish populations in areas such as Salford Quays.</p> <p>Zebra mussels are believed to be the source of deadly avian botulism poisoning that has killed tens of thousands of birds in the Great Lakes since the late 1990s. Because they are so efficient at filtering water, they tend to accumulate pollutants and toxins. Although they are edible, for this reason most experts recommend against consuming zebra mussels.</p> <p>They are also responsible for the near extinction of many species in the Great Lake system by outcompeting native species for food and by growing on top of and suffocating the native clams and mussels. Zebra mussels also affect all classes of algae species, resulting in a shortage of food sources to native species of freshwater mussels and fish in the Great Lakes.</p>
Giant African snail	<p>The species is native to East Africa, but it has been widely introduced to other parts of the world through the pet trade, as a food resource, and by accidental introduction. This species has been found in China since 1931, and its initial point of distribution in China was Xiamen. The snail has also been established in the Pratas Islands, of Taiwan, throughout India, the Pacific, Indian Ocean islands, and the West Indies. The species was established in the United States in 1936. They were brought to the U. S. through imports. They were intended to be used for educational uses and to be pets. Some were also introduced because they were accidentally shipped with other cargo</p> <p>In many places this snail is a pest of agriculture and households with the ability to transmit both human and plant pathogens. Suggested preventive measures include strict quarantine to prevent introduction and further spread. This snail has been given top national quarantine significance in the United States.[15] In the past, quarantine officials have been able to successfully intercept and eradicate incipient invasions on the mainland USA. In the wild, this species often harbors the parasitic nematode <i>Angiostrongylus cantonensis</i>, which can cause a very serious meningitis in humans. Human cases of this meningitis usually result from a person having eaten the raw or undercooked snail, but even handling live wild snails of this species can infect a person with the nematode and thus cause a life-threatening infection</p> <p>One particularly catastrophic attempt to biologically control this species occurred on South Pacific Islands. Colonies of <i>A. fulica</i> were introduced as a food reserve for the American military during World War II and they escaped. A carnivorous species (Florida rosy wolfsnail, <i>Euglandina rosea</i>) was later introduced by the United States government, in an attempt to control <i>A. fulica</i> but the rosy wolf snail instead heavily preyed upon the native <i>Partula</i>, causing the extinction of most <i>Partula</i> species within a decade.</p>
Atlantic Salmon	<p>Farmed Atlantic salmon are known to occasionally escape from cages and enter the habitat of wild populations. Interbreeding between escaped farm fish and wild fish decreases genetic diversity and introduces "the potential to genetically alter native populations, reduce local adaptation and negatively affect population viability and character." On the west coast of the United States and Canada, aquaculturists are generally under scrutiny to ensure that non-native Atlantic salmon cannot escape from their open-net pens, however occasional incidents of escape have been documented. During one incident in 2017, for example, up to 300,000 invasive Atlantic salmon escaped a farm among the San Juan Islands in Puget Sound, Washington.</p>

	<p>From 1905 until 1935, in excess of 8.6 million Atlantic salmon of various life stages (predominantly advanced fry) were intentionally introduced to more than 60 individual British Columbia lakes and streams. Historical records indicate, in a few instances, mature sea-run Atlantic salmon were captured in the Cowichan River; however, a self-sustaining population never materialized. Similarly unsuccessful results were realized after deliberate attempts at introduction by Washington as late as the 1980s. Consequently, environmental assessments by the US National Marine Fisheries Service (NMFS), the Washington Department of Fish and Wildlife and the BC Environmental Assessment Office have concluded the potential risk of Atlantic salmon colonization in the Pacific Northwest is low.</p>
Brown tree snake	<p>The brown tree snake (<i>Boiga irregularis</i>) is an arboreal rear-fanged colubrid snake native to eastern and northern coastal Australia, eastern Indonesia (Sulawesi to Papua), Papua New Guinea, and a large number of islands in northwestern Melanesia. This snake is infamous for being an invasive species responsible for devastating the majority of the native bird population in Guam. Shortly after World War II, and before 1952, the brown tree snake was accidentally transported from its native range in the South Pacific to Guam, probably as a stowaway in ship cargo or by crawling into the landing gear of Guam-bound aircraft. As a result of abundant prey resources on Guam and the absence of natural predators outside of feral pigs and mangrove monitors, brown tree snake populations reached unprecedented numbers. Snakes caused the extirpation of most of the native forest vertebrate species; thousands of power outages affecting private, commercial, and military activities; widespread loss of domestic birds and pets; and considerable emotional trauma to residents and visitors alike when snakes invaded human habitats with the potential for envenomation of small children. Since Guam is a major transportation hub in the Pacific, numerous opportunities exist for the brown tree snakes on Guam to be introduced accidentally to other Pacific islands as passive stowaways in ship and air traffic from Guam. To minimize this threat, trained dogs are used to search, locate, and remove brown tree snakes before outbound military and commercial cargo and transportation vessels leave the island. Numerous sightings of this species have been reported on other islands including Wake Island, Tinian, Rota, Okinawa, Diego Garcia, Hawaii, and even Texas in the continental United States. An incipient population is probably established on Saipan. Acetaminophen has been used to help eradicate the snake on Guam.</p>
Saint John's wort	<p>Although <i>Hypericum perforatum</i> is grown commercially in some regions of south east Europe, it is listed as a noxious weed in more than twenty countries and has introduced populations in South and North America, India, New Zealand, Australia, and South Africa. In pastures, St John's wort acts as both a toxic and invasive weed. It replaces native plant communities and forage vegetation to the extent of making productive land nonviable or becoming an invasive species in natural habitats and ecosystems. Ingestion by livestock such as horses, sheep, and cattle can cause photosensitization, central nervous system depression, spontaneous abortion or death. Effective herbicides for control of <i>Hypericum</i> include 2,4-D, picloram, and glyphosate. In western North America three beetles <i>Chrysolina quadrigemina</i>, <i>Chrysolina hyperici</i> and <i>Agrilus hyperici</i> have been introduced as biocontrol agents.</p>
Japanese beetle	<p>The Japanese beetle (<i>Popillia japonica</i>) is a common species of beetle. It is about 15 mm (0.6 in) long and 10 mm (0.4 in) wide, with iridescent copper-colored elytra and green thorax and head. It is not very destructive in Japan, where it is controlled by natural predators, but in North America, it is a noted pest of about 200 species of plants including rose bushes, grapes, hops, canna, crape myrtles, birch trees, linden trees, and others. As the name suggests, the Japanese beetle is native to Japan. The first written evidence of the insect appearing within the United States was in 1916 in a nursery near Riverton, New Jersey. The beetle larvae are thought to have entered the United States in a shipment of iris bulbs prior to 1912, when inspections of commodities entering the country began. As of 2015, only nine western US states were considered free of Japanese beetles. Beetles have been detected in airports on the west coast of the United States since the 1940s, but it was not until 2016 that populations were found in suburban and agricultural areas outside of Portland, Oregon. The first Japanese beetle found in Canada was in a tourist's car at Yarmouth, arriving in Nova Scotia by ferry from Maine in 1939. During the same year, three additional adults were captured at Yarmouth and three at Lacolle in southern Quebec. Japanese beetles have been found in the islands of the Azores since the 1970s. In 2014, the first population in mainland Europe was discovered near Milan in Italy. Several insect predators and parasitoids have been introduced to the United States for biocontrol. Two of them, <i>Istocheta aldrichi</i> and <i>Tiphia vernalis</i>, are well established with significant rates of parasitism. Japanese beetles feed on a large range of hosts, including leaves of plants of these common crops: Beans, strawberries, tomatos, peppers, grapes, hops, roses, cherries, plums, pears, peaches, raspberries, blackberries, corn, peas, okra, birch trees, linden trees, and blueberries.</p>
Cane toad	<p>The cane toad has been introduced to many regions of the world—particularly the Pacific—for the biological control of agricultural pests. These introductions have generally been well documented, and the cane toad may be one of the most studied of any introduced species.</p> <p>Before the early 1840s, the cane toad had been introduced into Martinique and Barbados, from French Guiana and Guyana. An introduction to Jamaica was made in 1844 in an attempt to reduce the rat population.[62] Despite its failure to control the rodents, the cane toad was introduced to Puerto Rico in the early 20th century in the hope that it would counter a beetle infestation ravaging the sugarcane plantations. The Puerto Rican scheme was successful and halted the economic damage caused by the beetles, prompting scientists in the 1930s to promote it as an ideal</p>

	<p>solution to agricultural pests.</p> <p>As a result, many countries in the Pacific region emulated the lead of Puerto Rico and introduced the toad in the 1930s. There are introduced populations in Australia, Florida, Papua New Guinea, the Philippines, the Ogasawara, Ishigaki Island and the Daitō Islands of Japan, most Caribbean islands, Fiji and many other Pacific islands, including Hawaii. Since then, the cane toad has become a pest in many host countries, and poses a serious threat to native animals.</p> <p>Cane toads pose a serious threat to native species when introduced to a new ecosystem. Classified as an invasive species in over 20 countries, there are multiple reports of the cane toad moving into a new area to be followed by a decline in the biodiversity in that region. The most documented region of the cane toad's invasion and subsequent effect on native species is Australia, where multiple surveys and observations of the toad's conquest have been completed. The best way to illustrate this effect is through the plight of the northern quoll, as well as Mertens' water monitor, a large lizard native to South and Southeast Asia.</p>
Brown trout	<p>The brown trout (<i>Salmo trutta</i>) is a European species of salmonid fish. Brown trout have been widely introduced into suitable environments around the world, including North and South America, Australasia, Asia, and South and East Africa. Introduced brown trout have established self-sustaining, wild populations in many introduced countries. The first introductions were in Australia in 1864 when 300 of 1500 brown trout eggs from the River Itchen survived a four-month voyage from Falmouth, Cornwall, to Melbourne on the sailing ship Norfolk. By 1866, 171 young brown trout were surviving in a Plenty River hatchery in Tasmania. Thirty-eight young trout were released in the river, a tributary of the River Derwent in 1866. By 1868, the Plenty River hosted a self-sustaining population of brown trout which became a brood source for continued introduction of brown trout into Australian and New Zealand rivers. Successful introductions into the Natal and Cape Provinces of South Africa took place in 1890 and 1892, respectively. By 1909, brown trout were established in the mountains of Kenya. The first introductions into the Himalayas in northern India took place in 1868, and by 1900, brown trout were established in Kashmir and Madras.</p> <p>In April 1884, the U.S. Fish Commission released 4900 brown trout fry into the Baldwin River, a tributary of the Pere Marquette River in Michigan. This was the first release of brown trout into U.S. waters. Between 1884 and 1890, brown trout were introduced into suitable habitats throughout the U.S. By 1900, 38 states and two territories had received stocks of brown trout. Their adaptability resulted in most of these introductions establishing wild, self-sustaining populations.</p>
Kudzu vine	<p>Kudzu's environmental and ecological damage results from acting through "interference competition", meaning it outcompetes other species for a resource. Kudzu competes with native flora for light, and acts to block their access to this vital resource by growing over them and shading them with its leaves. Native plants may then die as a result. Changes in leaf litter associated with kudzu infestation results in changes to decomposition processes and a 28% reduction in stocks of soil carbon, with potential implications for processes involved in global warming. Kudzu (<i>Pueraria lobata</i>) is an invasive plant in the United States. Recent U.S. Forest Service information indicates that kudzu is much less of a problem than previously thought. It shows kudzu to cover 227,000 acres, with "an increase of no more than 2,500 acres a year". During World War II, kudzu was introduced to Vanuatu and Fiji by United States Armed Forces to serve as camouflage for equipment and has become a major weed.</p>
Privet	<p>All nine species of privet currently in the southeast U.S. are invasive. The first species of privet was introduced into the United States in the 1700s as an ornamental plant used as a hedge or foliage for gardens. Glossy privet arrived in the U.S. in 1794, Chinese privet in 1825, Japanese privet in 1845, California privet in 1847, and Amur privet in 1860. Privets escaped cultivation in the early 1900s, but became widely naturalized during the 1950s-1970s or later. Currently privet is designated as a foreign invasive plant in Alabama and Georgia and considered a severe threat in North Carolina and Florida. It is estimated that Chinese privet alone occupies over one million hectares of land across 12 states ranging from Virginia to Florida and west to Texas.</p>
<i>Aedes aegypti</i>	<p><i>Aedes aegypti</i>, the yellow fever mosquito, is a mosquito that can spread dengue fever, chikungunya, Zika fever, Mayaro and yellow fever viruses, and other diseases. The mosquito can be recognized by white markings on its legs and a marking in the form of a lyre on the upper surface of its thorax. This mosquito originated in Africa, but is now found in tropical and subtropical regions throughout the world, like India, Southeast Asia, Australia, Southern United States, and throughout South America.</p>
<i>Xylella fastidiosa</i>	<p><i>Xylella fastidiosa</i>, a bacterium in the class Gammaproteobacteria, is a notable plant pathogen that causes phony peach disease in the southern United States, bacterial leaf scorch, oleander leaf scorch, and Pierce's disease (in grapevines), and citrus variegated chlorosis disease (CVC) in Brazil. In Europe it has attacked olive trees in the Salento area of Southern Italy causing the olive quick decline syndrome (OQDS). There are numerous subspecies of <i>Xylella fastidiosa</i> affecting many different hosts. In Europe, 359 different species of plant have been shown to be susceptible to this pathogenic bacterium; these include grape, peach, citrus, olive, oak, sycamore, euphorbia, hebe, lavender and rosemary. However, in many species, the host plant shows no symptoms, and this makes these symptomless plants reservoirs for infection.</p>

	<p>Pierce's disease (PD) was discovered in 1892 by Newton B. Pierce (1856–1916; California's first professional plant pathologist) on grapes in California near Anaheim, where it was known as "Anaheim disease." The disease is endemic in northern California, being spread by the blue-green sharpshooter, which only attacks grapevines that are adjacent to riparian habitats. It became a real threat to California's wine industry when the glassy-winged sharpshooter (GWSS), native to the southeast United States, was discovered in the Temecula Valley in California in 1996.</p> <p>In October 2013 the bacterium was found to be infecting olive trees in the region of Apulia in southern Italy. The disease was causing a rapid decline in olive plantations and by April 2015 it was affecting the whole Province of Lecce and other zones of Apulia. The bacterium had never previously been confirmed in Europe. Almond and oleander plants in the region have also tested positive for the pathogen. The sub-species involved in Italy is <i>Xylella fastidiosa</i> subsp. <i>pauca</i>. This shows a marked preference for olive trees and warm conditions and is thought unlikely to spread into Northern Europe.</p> <p>The disease has been called olive quick decline syndrome (OQDS; in Italian: complesso del disseccamento rapido dell'olivo). The disease causes withering and desiccation of terminal shoots, distributed randomly at first but which then expands to the rest of the canopy. This results in the collapse and death of the trees. In the affected groves, all of the plants show symptoms. By the beginning of 2015 it had infected up to a million trees in the southern region of Apulia.</p> <p>By July 2015, <i>Xylella fastidiosa</i> had reached Corsica, by October 2015, it had reached Mainland France, near Nice, in Provence-Alpes-Côte d'Azur, affecting the myrtle-leaf milkwort (<i>Polygala myrtifolia</i>). This is the subspecies <i>X. fastidiosa</i> subsp. <i>multiplex</i> which is considered to be a new genetic variant of the bacterium, different to that found in Italy. On 18 August 2016 in Corsica, 279 focuses of the infection have been detected, concentrated mostly in the south and the west of the island. In August 2016, the bacterium has been detected in Germany in an oleander plant. In January 2017 it was detected in Majorca, Spain and Ibiza, Spain. In June 2017, it was detected in Iberian peninsula, concretely in Guadalest, Spain and Alacant, Spain.</p>
Tilapia	<p>Throughout much of the tropics, tilapiine cichlids native to Africa and the Levant have been widely introduced into a variety of aquatic systems. In the U.S. States of Florida and Texas, tilapia were originally introduced out of an intention to curtail invasive plants. In an effort to meet the growing demand for tilapia, humans have farmed these fish in countries around the world. Capable of establishing themselves into new ponds and waterways, many tilapia have escaped aquaculture facilities across much of Asia, Africa and South America.</p> <p>Because tilapia are generally large, fast growing, breed rapidly, and can tolerate a wide variety of water conditions (even marine environments), tilapia establish themselves into new habitats rather quickly. In doing so, tilapia often out compete native fish, create turbidity in rivers by digging, and can reduce available sun light for aquatic plants. Tilapia greatly impact and alter local habitat. Many environmental problems wrought by tilapia have been observed in different locations, including Australia, the Philippines, and the United States.</p>
Argentine ant	<p>The Argentine ant, <i>Linepithema humile</i> (formerly <i>Iridomyrmex humilis</i>), is an ant native to northern Argentina, Uruguay, Paraguay, Bolivia and southern Brazil. It is an invasive species that has been established in many Mediterranean climate areas, inadvertently introduced by humans to many places, including South Africa, New Zealand, Japan, Easter Island, Australia, Europe, Hawaii, and the continental United States. They have been extraordinarily successful, in part, because different nests of the introduced Argentine ants seldom attack or compete with each other, unlike most other species of ant. In their introduced range, their genetic makeup is so uniform that individuals from one nest can mingle in a neighboring nest without being attacked. Thus, in most of their introduced range, they form supercolonies. "Some ants have an extraordinary social organization, called unicoloniality, whereby individuals mix freely among physically separated nests. This type of social organization is not only a key attribute responsible for the ecological domination of these ants, but also an evolutionary paradox and a potential problem for kin selection theory because relatedness between nest mates is effectively zero." The Very Large Colony, which covers territory from San Diego to beyond San Francisco, may have a population of nearly one trillion individuals. In its introduced range, the Argentine ant often displaces most or all native ants. This can, in turn, imperil other species in the ecosystem, such as native plants that depend on native ants for seed dispersal, or lizards that depend on native ants for food. For example, the recent severe decline in coastal horned lizards in southern California is closely tied to Argentine ants displacing native ant species on which the lizards feed.</p>
Walking catfish	<p>The walking catfish (<i>Clarias batrachus</i>) is a species of freshwater airbreathing catfish native to Southeast Asia. Within Asia, this species has been introduced widely. It has also introduced outside its native range where it is considered an invasive species. In the United States, it is established in Florida and reported in California, Connecticut, Georgia, Massachusetts, and Nevada and regarded as an invasive species as they can destroy fish farms. The walking catfish was imported to Florida, reportedly from Thailand, in the early 1960s for the aquaculture trade.[5] The first introductions apparently occurred in the mid-1960s when adult fish imported as brood stock escaped, either from a fish farm in northeastern Broward County or from a truck transporting brood fish between Dade and Broward Counties. Additional introductions in Florida, supposedly purposeful releases,</p>

	<p>were made by fish farmers in the Tampa Bay area, Hillsborough County in late 1967 or early 1968, after the state banned the importation and possession of walking catfish. Aquarium releases likely are responsible for introductions in other states. Dill and Cordone (1997) reported this species has been sold by tropical fish dealers in California for some time. They have also been spotted occasionally in the Midwest. In Florida, walking catfish are known to have invaded aquaculture farms, entering ponds where these predators prey on agricultural fish stocks. In response, fish farmers have had to erect fences to protect ponds. Authorities have also created laws that ban possession of walking catfish. In 2017, <i>Clarias</i> were recovered from the River Tonge, near Bolton, Northern England.</p>
Citrus greening disease	<p>Citrus greening disease ("yellow dragon disease"; or HLB), is a disease of citrus caused by a vector-transmitted pathogen. The causative agents are motile bacteria, <i>Candidatus Liberibacter</i> spp. The disease is vectored and transmitted by the Asian citrus psyllid, <i>Diaphorina citri</i>, and the African citrus psyllid, <i>Trioza erytreae</i>, also known as the two-spotted citrus psyllid. It has also been shown to be graft-transmissible. Three different types of HLB are currently known: The heat-tolerant Asian form, and the heat-sensitive African and American forms. The disease was first described in 1929 and first reported in China in 1943. The African variation was first reported in 1947 in South Africa, where it is still widespread. Eventually, it affected the United States, reaching Florida in 2005. Within three years, it had spread to the majority of citrus farms. The rapid increase in this disease has threatened the citrus industry not only in Florida, but the entire US. As of 2009, 33 countries have reported HLB infection in their citrus crop.</p> <p>Distribution of the Asian citrus psyllid that is a vector of the citrus greening disease, is primarily in tropical and subtropical Asia. It has been reported in all citrus-growing regions in Asia except mainland Japan. The disease has affected crops in China, Taiwan, India, Sri Lanka, Malaysia, Indonesia, Myanmar, the Philippines, Pakistan, Thailand, the Ryukyu Islands, Nepal, Saudi Arabia, and Afghanistan. Areas outside Asia have also reported the disease: Réunion, Mauritius, Brazil, Paraguay, and Florida in the U.S. since 2005, and in several municipalities in Mexico since 2009. On March 30, 2012, citrus greening disease was confirmed in a single citrus tree in Hacienda Heights, Los Angeles County, California. The first report of HLB in Texas occurred on January 13, 2012 from a Valencia sweet orange tree in a commercial orchard in San Juan, Texas. The distribution of the African citrus psyllid includes Africa, Madeira, Saudi Arabia, Portugal, and Yemen. This species is sensitive to high temperatures and will not develop at temperatures greater than 25°C. It is also a vector of the African strain of huanglongbing (<i>Candidatus Liberibacter africanus</i>), which is also sensitive to heat. This strain of HLB is reported to occur in Africa, (Burundi, Cameroon, Central African Republic, Comoros, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Reunion, Rwanda, South Africa, St. Helena (unconfirmed), Swaziland, Tanzania, Zimbabwe), Saudi Arabia, and Yemen.</p>
Asian tiger mosquito	<p><i>Aedes albopictus</i> (<i>Stegomyia albopicta</i>), from the mosquito (Culicidae) family, also known as (Asian) tiger mosquito or forest mosquito, is a mosquito native to the tropical and subtropical areas of Southeast Asia; however, in the past few decades, this species has spread to many countries through the transport of goods and international travel. As of 2006, <i>Ae. albopictus</i> was not native to Australia and New Zealand. The species was introduced there multiple times, but has yet to establish itself. This is due to the well-organized entomological surveillance programs in the harbors and airports of these countries. Nevertheless, as of 2006 it has become domestic on the islands in the Torres Strait between Queensland, Australia, and New Guinea.</p> <p>In Europe, Asian tiger mosquitos first emerged in Albania in 1979, introduced through a shipment of goods from China. In 1990–1991, they were most likely brought to Italy in used tires from Georgia (USA), and since then have spread throughout the entire mainland of Italy, as well as parts of Sicily and Sardinia. Since 1999, they have established themselves on the mainland of France, primarily southern France. In 2002, they were also discovered in a vacation town on the island of Corsica, but did not completely establish themselves there until 2005. In Belgium, they were detected in 2000 and 2013, in 2001 in Montenegro, 2003 in Canton Ticino in southern Switzerland, and Greece, 2004 in Spain and Croatia, 2005 in the Netherlands and Slovenia, and 2006 in Bosnia and Herzegovina. In the fall of 2007, the first tiger mosquito eggs were discovered in Rastatt (Baden-Wuerttemberg, Germany). Shortly before, they were found in the northern Alps of Switzerland in Canton Aargau. since 2010, it has also been sighted increasingly in Malta during summer. In September 2016, Public Health England found eggs, though no mosquitos, in a lorry park at Folkestone service station on the M20, near Westenhanger, which is 6 miles West of the Eurotunnel.</p> <p>In the United States, it was initially found in 1983 in Memphis, Tennessee. then at the Port of Houston in a 1985 shipment of used tires, and spread across the South up the East Coast to become prevalent in the Northeast. It was not discovered in Southern California until 2001, then eradicated for over a decade; however, by 2011, it was again being found in Los Angeles County traps, then over the next two years expanded its range to Kern County and San Diego County. As of 2013, North American land favoring the environmental conditions of the Asian tiger mosquito was expected to more than triple in size in the coming 20 years, especially in urban areas. As of 2017 <i>Aedes albopictus</i> mosquitoes have been identified in 1,368 counties in 40 U.S states. In Latin America, the Asian tiger mosquito was first discovered 1986 in Brazil and in 1988 in Argentina and Mexico, as well. Other parts of Latin America where the Asian tiger mosquito was discovered are the Dominican Republic in 1993, Bolivia, Cuba,</p>

	<p>Honduras, and Guatemala in 1995, El Salvador in 1996, Paraguay in 1999, Panama in 2002, and Uruguay and Nicaragua in 2003.</p> <p>In Africa, the species was first detected in 1990 in South Africa. In Nigeria, it has been domestic since at least 1991. It spread to Cameroon in 1999/2000, to the Bioko Island of Equatorial Guinea in 2001, and to Gabon in 2006. In the Middle East, the species was detected in Lebanon in 2003 and in Syria in 2005; the first record in Israel was published in 2003.</p>
European rabbit	<p>The European rabbit has been introduced as an exotic species into several environments, often with harmful results to vegetation and local wildlife, making it an invasive species. Such locations include Britain, where they were first introduced by the Romans following their invasion in AD 43; (in November 2004 there were about 40 million European rabbits in the British Isles), Laysan Island (1903) and Lisianski Island in the Hawaiian Islands; Macquarie Island; Smith Island, San Juan Island (around 1900) later spreading to the other San Juan Islands; several islands off the coast of Southern Africa, one well-known example being that of Robben Island; Australia and New Zealand.</p> <p>Twenty-four European rabbits were introduced to Australia in 1859 by estate owner Thomas Austin in Victoria. They soon spread throughout the country due to the lack of natural predators, widespread farming producing an ideal habitat, and mild Australian winters allowing them to breed year-round. Australia's equivalent to the rabbit, the bilby, was quickly pushed out by the rabbits. The bilbies are endangered, but are now making a comeback due to government protection. Between 1901 and 1907, Australia built an immense "rabbit-proof fence" to halt the westward expansion of the introduced rabbit population. The European rabbit can not only jump very high, but also burrow underground, making fencing essentially futile. Destroying warrens through ripping (a procedure wherein rabbits are dismembered or buried alive as a bulldozer dragging sharp tines is driven over their warrens/burrows), ploughing, blasting, and fumigating is widely used, especially on large farms (known as "stations"). The sandy soil in many parts of Australia makes ripping and ploughing a viable method of control, and both tractors and bulldozers are used for this operation.</p> <p>During the 1950s, experiments with introduction of a virus, Myxomatosis cuniculi, provided some relief in Australia, but not in New Zealand, where the insect vectors necessary for spread of the disease were not present. Myxomatosis can also infect pet rabbits of the same species. Today's remaining wild rabbits in Australia are largely immune to myxomatosis. The rabbit haemorrhagic disease virus has been cleared as a biological control agent against the European rabbit in Australia, and has already killed millions of the animals. It was also illegally introduced in New Zealand. In 1950, after research was conducted by Frank Fenner, myxoma virus was deliberately released into the rabbit population, causing it to drop from an estimated 600 million to around 100 million. Genetic resistance in the remaining rabbits allowed the population to recover to 200–300 million by 1991.</p>
Brown rat	<p>Likely originating from the plains of Asia, northern China and Mongolia, the brown rat spread to other parts of the world sometime in the Middle Ages. The question of when brown rats became commensal with humans remains unsettled, but as a species, they have spread and established themselves along routes of human migration and now live almost everywhere humans are.</p> <p>The brown rat may have been present in Europe as early as 1553, a conclusion drawn from an illustration and description by Swiss naturalist Conrad Gesner in his book <i>Historiae animalium</i>, published 1551–1558. Though Gesner's description could apply to the black rat, his mention of a large percentage of albino specimens—not uncommon among wild populations of brown rats—adds credibility to this conclusion. Reliable reports dating to the 18th century document the presence of the brown rat in Ireland in 1722, England in 1730, France in 1735, Germany in 1750, and Spain in 1800, becoming widespread during the Industrial Revolution. It did not reach North America until around 1750–1755.</p> <p>As it spread from Asia, the brown rat generally displaced the black rat in areas where humans lived. In addition to being larger and more aggressive, the change from wooden structures and thatched roofs to bricked and tiled buildings favored the burrowing brown rats over the arboreal black rats. In addition, brown rats eat a wider variety of foods, and are more resistant to weather extremes.</p>
Ferel cats	<p>A 2013 study by Scott R. Loss and others of the Smithsonian Conservation Biology Institute and the U.S. Fish and Wildlife Service suggested that free-ranging domestic cats (mostly unowned) are the top human-caused threat to wildlife in the United States, killing an estimated 1.3 to 4 billion birds and 6.3 to 22.3 billion mammals annually. These figures were much higher than previous estimates for the U.S. Unspecified species of birds native to the U.S. and mammals including mice, shrews, voles, squirrels and rabbits were considered most likely to be preyed upon by cats.</p>
Harlequin Ladybugs	<p><i>Harmonia axyridis</i> (the harlequin ladybug) is an example of how an animal might be partly welcome and partly harmful. It was introduced into North America from Asia in 1916 to control aphids, but is now the most common species, outcompeting many of the native species. It has since spread to much of western Europe, reaching the UK in 2004. It has become something of a domestic and agricultural pest in some regions, and gives cause for</p>

	<p>ecological concern. It similarly has turned up in parts of Africa, where it has proved variously unwelcome, perhaps most prominently in vine-related crops.</p> <p>This species became established in North America as the result of introductions into the United States in an attempt to control the spread of aphids. In the last three decades, this insect has spread throughout the United States and Canada, and has been a prominent factor in controlling aphid populations. In the US, the first introductions took place as far back as 1916. The species repeatedly failed to establish in the wild after successfully controlling aphid populations, but an established population of beetles was observed in the wild near New Orleans, Louisiana, around 1988. In the following years, it quickly spread to other states, being occasionally observed in the Midwest within five to seven years and becoming common in the region by about 2000. The species was also established in the Northwest by 1991, and the Northeast by 1994, aided by additional introductions from the native range, rather than just reaching there from the Southeast. Reportedly, it has heavily fed on soybean aphids (which recently appeared in the US after coming from China), supposedly saving farmers vast sums of money in 2001.</p> <p>Worldwide routes of propagation of <i>H. axyridis</i> have been described with genetic markers in 2010. The populations in eastern and western North America originated from two independent introductions from the native range. The South American and African populations both originated independently from eastern North America. The European population also originated from eastern North America, but with substantial genetic admixture with individuals of the European biocontrol strain (estimated at about 40%).</p> <p>This species is widely considered to be one of the world's most invasive insects, partly due to their tendency to overwinter indoors and the unpleasant odor and stain left by their bodily fluid when frightened or squashed, as well as their tendency to bite humans. In Europe it is currently increasing to the detriment of indigenous species, its voracious appetite enabling it to outcompete and even eat other ladybugs. The harlequin ladybug is also highly resistant to diseases that affect other ladybug species and carries a microsporidian parasite to which it is immune but that can infect and kill other species. Native ladybug species have experienced often dramatic declines in abundance in areas invaded by <i>H. axyridis</i>.</p>
European starling	<p>The European starling was purposefully introduced to North America in 1890–1891 by the American Acclimatization Society, an organization dedicated to introducing European flora and fauna into North America for cultural and economic reasons. Eugene Schieffelin, chairman at the time, allegedly decided all birds mentioned by William Shakespeare should be in North America. The bird had been mentioned in <i>Henry IV, Part 1</i>, and a hundred of them were released from New York's Central Park.</p>
Varroa destructor	<p>Varroa destructor (Varroa mite) is an external parasitic mite that attacks the honey bees <i>Apis cerana</i> and <i>Apis mellifera</i>. The disease caused by the mites is called varroosis. The Varroa mite can only reproduce in a honey bee colony. It attaches to the body of the bee and weakens the bee by sucking fat bodies. In this process, RNA viruses such as the deformed wing virus (DWV) spread to bees. A significant mite infestation will lead to the death of a honey bee colony, usually in the late autumn through early spring. The Varroa mite is the parasite with the most pronounced economic impact on the beekeeping industry. It may be a contributing factor to colony collapse disorder, as research shows it is the main factor for collapsed colonies in Ontario, Canada and the United States</p> <p>Varroa mites originally only occurred in Asia, on the Asian honeybee, <i>Apis cerana</i>, but this species has been introduced to many other countries on several continents, resulting in disastrous infestations of European honeybees. From the 1960s to 2008 the mite infected bee populations in Japan, USSR, Eastern Europe, Brazil, Poland, France, Switzerland, Spain, Italy, Portugal, United States, Canada, United Kingdom, New Zealand, and Hawaii.</p>
Marine organisms transferred with ballast water	<p>There are hundreds of organisms carried in ballast water that cause problematic ecological effects outside of their natural range. The International Maritime Organization (IMO) lists the ten most unwanted species as:</p> <p>Cholera <i>Vibrio cholerae</i> (various strains) Cladoceran Water Flea <i>Cercopagis pengoi</i> Mitten Crab <i>Eriocheir sinensis</i> Toxic algae (red/brown/green tides) (various species) Round Goby <i>Neogobius melanostomus</i> North American Comb Jelly <i>Mnemiopsis leidyi</i> North Pacific Seastar <i>Asterias amurensis</i> Zebra Mussel <i>Dreissena polymorpha</i> Asian Kelp <i>Undaria pinnatifida</i> European Green Crab <i>Carcinus maenas</i></p>
Honey Bees	<p>Honey bees appear to have their center of origin in South and Southeast Asia (including the Philippines), as all the extant species except <i>Apis mellifera</i> are native to that region. Notably, living representatives of the earliest lineages to diverge (<i>Apis florea</i> and <i>Apis andreniformis</i>) have their center of origin there.</p>

The first *Apis* bees appear in the fossil record at the Eocene–Oligocene boundary (34 mya), in European deposits. The origin of these prehistoric honey bees does not necessarily indicate Europe as the place of origin of the genus, only that the bees were present in Europe by that time. Few fossil deposits are known from South Asia, the suspected region of honey bee origin, and fewer still have been thoroughly studied. No *Apis* species existed in the New World during human times before the introduction of *A. mellifera* by Europeans. Only one fossil species is documented from the New World, *Apis nearctica*, known from a single 14-million-year-old specimen from Nevada.

The close relatives of modern honey bees – e.g. bumblebees and stingless bees – are also social to some degree, and social behavior seems a plesiomorphic trait that predates the origin of the genus. Among the extant members of *Apis*, the more basal species make single, exposed combs, while the more recently evolved species nest in cavities and have multiple combs, which has greatly facilitated their domestication. Most species have historically been cultured or at least exploited for honey and beeswax by humans indigenous to their native ranges. Only two of these species have been truly domesticated, one (*A. mellifera*) at least since the time of the building of the Egyptian pyramids, and only that species has been moved extensively beyond its native range. Honey bees are the only extant members of the tribe Apini. Today's honey bees constitute three clades.

Africanized bees have spread across the southern United States, where they pose a slight danger to humans (making beekeeping—particularly hobby beekeeping—difficult). As an invasive species, feral honey bees have become a significant environmental problem in non-native areas. Imported bees may displace native bees and birds, and may also promote the reproduction of invasive plants ignored by native pollinators. Unlike native bees, they do not properly extract or transfer pollen from plants with pore anthers (anthers which only release pollen through tiny apical pores); this requires buzz pollination, a behavior rarely exhibited by honey bees. Honey bees reduce fruiting in *Melastoma affine*, a plant with pore anthers, by robbing its stigmas of previously deposited pollen.

African honeybees are considered an invasive species in the Americas. As of 2002, the Africanized honeybees had spread from Brazil south to northern Argentina and north to Central America, Trinidad (West Indies), Mexico, Texas, Arizona, Nevada, New Mexico, Florida, and southern California. Their expansion stopped for a time at eastern Texas, possibly due to the large population of honey bee hives in the area. However, discoveries of the Africanized bees in southern Louisiana indicate this subspecies has penetrated this barrier, or has come as a swarm aboard a ship.

In June 2005, it was discovered that the bees had penetrated the border of Texas and had spread into southwest Arkansas. On September 11, 2007, Commissioner Bob Odom of the Louisiana Department of Agriculture and Forestry said that Africanized honey bees established themselves in the New Orleans area. In February 2009, Africanized honeybees were found in southern Utah. The bees had spread into eight counties in Utah, as far north as Grand and Emery counties by May 2017. In October 2010, a 73-year-old man was killed by a swarm of Africanized honey bees while clearing brush on his south Georgia property, as determined by Georgia's Department of Agriculture. In 2012 state officials reported that a colony was found for the first time in a bee keepers colony in Monroe County, eastern Tennessee. In June 2013, 62-year-old Larry Goodwin of Moody, TX was killed by a swarm of bees.

Colony collapse disorder (CCD) is the phenomenon that occurs when the majority of worker bees in a colony disappear and leave behind a queen, plenty of food and a few nurse bees to care for the remaining immature bees and the queen. While such disappearances have occurred throughout the history of apiculture, and were known by various names (disappearing disease, spring dwindle, May disease, autumn collapse, and fall dwindle disease), the syndrome was renamed colony collapse disorder in late 2006 in conjunction with a drastic rise in the number of disappearances of western honey bee (*Apis mellifera*) colonies in North America. European beekeepers observed similar phenomena in Belgium, France, the Netherlands, Greece, Italy, Portugal, and Spain, Switzerland and Germany, albeit to a lesser degree, and the Northern Ireland Assembly received reports of a decline greater than 50%.

Colony collapse disorder causes significant economic losses because many agricultural crops (although no staple foods) worldwide are pollinated by western honey bees. According to the Agriculture and Consumer Protection Department of the Food and Agriculture Organization of the United Nations, the worth of global crops with honey bee pollination was estimated at close to \$200 billion in 2005. Shortages of bees in the US have increased the cost to farmers renting them for pollination services by up to 20%.

In the six years leading up to 2013, more than 10 million beehives were lost, often to CCD, nearly twice the normal rate of loss. To put this in perspective, according to U.N. FAO data, the world's beehive stock rose from around 50 million in 1961 to around 83 million in 2014, which is about 1.3% average annual growth. Average annual growth has accelerated to 1.9% since 2009. Several possible causes for CCD have been proposed, but no single proposal has gained widespread acceptance among the scientific community. Suggested causes include: infections with Varroa and Acarapis mites; malnutrition; various pathogens; genetic factors; immunodeficiencies; loss of habitat;

	<p>changing beekeeping practices; or a combination of factors. A large amount of speculation has surrounded a family of pesticides called neonicotinoids as having caused CCD.</p>
Pseudogymnoascus	<p>White-nose syndrome (WNS) is an emerging disease in North American bats which by 2012 was associated with at least 5.7 million bat deaths. The condition is named for a distinctive fungal growth around the muzzles and on the wings of hibernating bats and was first identified from a February 2006 photo taken in a cave in Schoharie County, New York. It has rapidly spread. By 2016, the fungus had been found in caves and mines of 29 states throughout the Northeastern US and 5 eastern Canadian provinces. In March 2016, it reached the West Coast, when it was confirmed in a little brown bat (<i>Myotis lucifugus</i>) in the state of Washington and in April 2017, it was found in several bat species in Texas, bringing the total number of infected states to 33.</p> <p>The disease is caused by the fungus <i>Pseudogymnoascus destructans</i>, which colonizes the bat's skin. No obvious treatment or means of preventing transmission is known, and some species have declined >90% within five years of the disease reaching a site. <i>Pseudogymnoascus destructans</i> is believed to originate from Europe. The current <i>P. destructans</i> European distribution includes Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Hungary, the Netherlands, Poland, Romania, Slovakia, Switzerland, Turkey, Ukraine and the United Kingdom.</p> <p>It is likely the fungus was brought to North America by human activities, because no bats normally migrate between Europe and North America, and the fungus was first discovered in New York where there are major trans-Atlantic air and shipping terminals. Geographical translocation of bats by ship and airplane have been documented. Research has shown the fungus can persist on human clothing and thus could be carried between locations by people, but as of 2016 it has not been demonstrated that this has played any role in the spread of the disease.</p>
Chytridiomycosis	<p>Chytridiomycosis is an infectious disease in amphibians, caused by the chytrid fungi <i>Batrachochytrium dendrobatidis</i> and <i>Batrachochytrium salamandrivorans</i>, a nonhyphal zoosporic fungus. Chytridiomycosis has been linked to dramatic population declines or even extinctions of amphibian species in western North America, Central America, South America, eastern Australia, East Africa (Tanzania) and Dominica and Montserrat in the Caribbean. Much of the New World is also at risk of the disease arriving within the coming years. The fungus is capable of causing sporadic deaths in some amphibian populations and 100% mortality in others. No effective measure is known for control of the disease in wild populations. Various clinical signs are seen by individuals affected by the disease. A number of options are possible for controlling this disease-causing fungus, though none has proved to be feasible on a large scale. The disease has been proposed as a contributing factor to a global decline in amphibian populations that apparently has affected about 30% of the amphibian species of the world.</p> <p>The geographic range of chytridiomycosis is difficult to ascertain. If it occurs, the disease is only present where the fungus <i>B. dendrobatidis</i> is present. However, the disease is not always present where the fungus is. Reasons for amphibian declines are often termed 'enigmatic' because the cause is unknown. Why some areas are affected by the fungus while others are not is not fully understood. Oscillating factors such as climate, habitat suitability, and population density may be factors which cause the fungus to infect amphibians of a given area. Therefore, when considering the geographic range of chytridiomycosis, the range of <i>B. dendrobatidis</i> occurrence must be considered. The geographic range of <i>B. dendrobatidis</i> has recently been mapped, and spans much of the world. <i>B. dendrobatidis</i> has been detected in 56 of 82 countries, and in 516 of 1240 (42%) species using a data set of more than 36,000 individuals. It is widely distributed in the Americas, and detected sporadically in Africa, Asia, and Europe. Asia, for example, has only 2.35% prevalence.</p> <p>The range suitable for <i>B. dendrobatidis</i> in the New World is vast. Regions with its highest suitability include habitats that contain the world's most diverse amphibian fauna. Areas at risk are the Sierra Madre Pine Oak Occidental Forest, the Sonoran and Sinaloan dry forest, the Veracruz moist forest, Central America east from the Isthmus of Tehuantepec, the Caribbean Islands, the temperate forest in Chile and western Argentina south of 30°S, the Andes above 1000 m above sea level in Venezuela, Colombia, and Ecuador, eastern slopes of the Andes in Peru and Bolivia, the Brazilian Atlantic forest, Uruguay, Paraguay, and northeastern Argentina, as well as the southwestern and Madeira-Tapaj Amazonian rainforests. Currently, the effects of chytridiomycosis are seen most readily in Central America, eastern Australia, South America, and western North America.</p> <p><i>Batrachochytrium salamandrivorans</i> (Bsal) is a pathogenic chytrid fungus that infects salamanders and newts and emerged only recently as a potentially important threat to species in Europe and North America. It was described in 2013 based on a strain collected from skin tissue of fire salamanders. The pathogen, unidentified up to then, had devastated fire salamander populations in the Netherlands. Molecular phylogenetics confirmed it as related to the well known chytrid <i>B. dendrobatidis</i>. Like this species, it causes chytridiomycosis which is manifested in skin lesions and is lethal for the salamanders. Another study estimated that this species had diverged from <i>B. dendrobatidis</i> in the Late Cretaceous or early Paleogene. It was shown that while frogs and caecilians were immune to <i>B. salamandrivorans</i>, it was lethal to many European and some North American salamanders. East Asian salamanders were susceptible but able to limit the infection. The fungus was also detected in a more-than-150-year-old museum specimen of the Japanese sword-tailed newt. This suggests it had originally emerged and co-evolved</p>

	<p>with salamanders in East Asia, forming its natural reservoir, and was introduced to Europe rather recently through the trade of species such as the fire belly newts as pets.</p> <p>It has been suggested that <i>Batrachochytrium dendrobatidis</i> originated in Africa and subsequently spread to other parts of the world by trade in African clawed frogs (<i>Xenopus laevis</i>). In this study, 697 archived specimens of three species of <i>Xenopus</i>, previously collected from 1879 to 1999 in southern Africa, were examined. The earliest case of chytridiomycosis was found in a <i>X. laevis</i> specimen from 1938. The study also suggests that chytridiomycosis had been a stable infection in southern Africa from 23 years prior to finding any infected outside of Africa. There is more recent information that the species originated on the Korean peninsular and was spread by the trade in frogs.</p>
Nile monitor	<p>Nile monitors are native to Africa and the species is distributed throughout the entire central and southern regions of the continent, including Sudan and a portion of central Egypt along the Nile river. In Florida, established breeding populations of Nile monitors have been known to exist in different parts of the state since at least 1990. The vast majority of the established breeding population of the species is in Lee County, Florida, particularly in the Cape Coral and surrounding regions, including the nearby barrier islands (Sanibel, Captiva, and North Captiva), Pine Island, Fort Myers, and Punta Rassa. Established populations also exist in adjacent Charlotte County, especially on Gasparilla Island. Areas with a sizeable number of Nile monitor sightings in Florida include Palm Beach County just southwest of West Palm Beach along State Road 80. In July 2008, a Nile monitor was spotted in Homestead, a small city southwest of Miami. Other sightings have been reported near Hollywood, Naranja, and as far south as Key Largo in the Florida Keys. The potential for the established population of Nile monitors in Lee, Charlotte, and other counties in Florida, to negatively impact indigenous crocodilians (American alligator, <i>Alligator mississippiensis</i>, and American crocodile, <i>Crocodylus acutus</i>) is enormous, given that they normally raid crocodile nests, eat eggs, and prey on small crocodiles in Africa. Anecdotal evidence indicates a high rate of disappearance of domestic pets and feral cats in Cape Coral.</p>
Guppy	<p>The guppy (<i>Poecilia reticulata</i>), also known as millionfish and rainbow fish, is one of the world's most widely distributed tropical fish, and one of the most popular freshwater aquarium fish species. Guppies are native to Antigua and Barbuda, Barbados, Brazil, Guyana, Jamaica, the Netherlands Antilles, Trinidad and Tobago, the U.S. Virgin Islands, and Venezuela. However, guppies have been introduced to many different countries on every continent except Antarctica. Sometimes this has occurred accidentally, but most often as a means of mosquito control. The guppies were expected to eat the mosquito larvae and help slow the spread of malaria, but in many cases, these guppies have had a negative impact on native fish populations. Field studies reveal that guppies have colonized almost every freshwater body accessible to them in their natural ranges, especially in the streams located near the coastal fringes of mainland South America. Although not typically found there, guppies also have tolerance to brackish water and have colonized some brackish habitats. They tend to be more abundant in smaller streams and pools than in large, deep, or fast-flowing rivers.</p>
Lionfish	<p>The lionfish is a predator native to the Indo-Pacific. It aggressively preys on small fish and invertebrates. They can be found around the seaward edge of reefs and coral, in lagoons, and on rocky surfaces commonly to 50 m deep, although lionfish have on multiple occasions been recorded to 300 m depth. They show a preference for turbid inshore areas and harbors, and have a generally hostile attitude and are territorial towards other reef fish. Many universities in the Indo-Pacific have documented reports of Pterois aggression towards divers and researchers. Two of the twelve species of Pterois, the red lionfish (<i>P. volitans</i>) and the common lionfish (<i>P. miles</i>), have established themselves as significant invasive species off the East Coast of the United States and in the Caribbean. About 93% of the invasive population in the Western Atlantic is <i>P. volitans</i>. They have been described as "one of the most aggressively invasive species on the planet".</p> <p>The red lionfish is found off the East Coast and Gulf Coast of the United States and in the Caribbean Sea, and was likely first introduced off the Florida coast by the early to mid-1990s. This introduction may have occurred in 1992 when Hurricane Andrew destroyed an aquarium in southern Florida, releasing six lionfish into Biscayne Bay. However, a lionfish was discovered off the coast of Dania Beach, south Florida, as early as 1985, before Hurricane Andrew. The lionfish resemble those of the Philippines, implicating the aquarium trade. The lionfish may have been purposely discarded by unsatisfied aquarium enthusiasts. This is in part because lionfish require an experienced aquarist, but are often sold to novices who find their care too difficult. In 2001, NOAA documented several sightings of lionfish off the coast of Florida, Georgia, South Carolina, North Carolina, Bermuda, and Delaware. In August 2014, when the Gulf Stream was discharging into the mouth of the Delaware Bay, two lionfish were caught by a surf fisherman off the ocean side shore of Cape Henlopen State Park: one red one that weighed 1 pound 4.5 ounces and one common one that weighed 1 pound 2 ounces. Three days later a 1-pound 3 ounce red lionfish was caught off the shore of Broadkill Beach which is in the Delaware Bay approximately 15 miles north of Cape Henlopen State Park. Lionfish were first detected in the Bahamas in 2004. In June 2013 lionfish were discovered as far east as Barbados, and as far south as the Los Roques Archipelago and many Venezuelan continental beaches. Lionfish were first sighted in Brazilian waters in late 2014. Genetic testing on a single captured individual revealed that it was related to the populations found in the Caribbean, suggesting larval dispersal rather than an intentional release.</p> <p>Adult lionfish specimens are now found along the United States East Coast from Cape Hatteras, North Carolina, to</p>

	<p>Florida, and along the Gulf Coast to Texas. They are also found off Bermuda, the Bahamas, and throughout the Caribbean, including the Turks and Caicos, Haiti, Cuba, the Dominican Republic, the Cayman Islands, Aruba, Curacao, Trinidad and Tobago, Bonaire, Puerto Rico, St. Croix, Belize, Honduras, and Mexico. Population densities continue to increase in the invaded areas, resulting in a population boom of up to 700% in some areas between 2004 and 2008. Lionfish have also established themselves in parts of the Mediterranean with Pterois miles being found in the waters around Cyprus and Malta. Pterois species are known for devouring many other aquarium fishes, unusual in that they are among the few fish species to successfully establish populations in open marine systems.</p> <p>Extreme temperatures present geographical constraints in the distribution of aquatic species, indicating temperature tolerance plays a role in the lionfish's survival, reproduction, and range of distribution. The abrupt differences in water temperatures north and south of Cape Hatteras directly correlate with the abundance and distribution of Pterois. Pterois expanded along the southeastern coast of the United States and occupied thermal-appropriate zones within 10 years, and the shoreward expansion of this thermally appropriate habitat is expected in coming decades as winter water temperatures warm in response to anthropogenic climate change. Although the timeline of observations points to the east coast of Florida as the initial source of the western Atlantic invasion, the relationship of the United States East Coast and Bahamian lionfish invasion is uncertain. Lionfish can tolerate a minimum salinity of 5 parts per thousand and even withstand pulses of freshwater, which means they can also be found in estuaries of freshwater rivers.</p> <p>Lionfish have successfully pioneered the coastal waters of the Atlantic in less than a decade and pose a major threat to reef ecological systems in these areas. A study comparing their abundance from Florida to North Carolina with several species of groupers found they were second only to the native scamp grouper and equally abundant to the graysby, gag, and rock hind. This could be due to a surplus of resource availability resulting from the overfishing of lionfish predators like grouper. Although the lionfish has not expanded to a population size currently causing major ecological problems, their invasion in the United States coastal waters could lead to serious problems in the future. One likely ecological impact caused by Pterois could be their impact on prey population numbers by directly affecting food web relationships. This could ultimately lead to reef deterioration and could negatively influence Atlantic trophic cascade. Lionfish have already been shown to overpopulate reef areas and display aggressive tendencies, forcing native species to move to waters where conditions might be less than desirable. Lionfish could be reducing Atlantic reef diversity by up to 80%. In July 2011, lionfish were reported for the first time in the Flower Garden Banks National Marine Sanctuary off the coast of Louisiana. Sanctuary officials said they believe the species will be a permanent fixture, but hope to monitor and possibly limit their presence. Since lionfish thrive so well in the Atlantic and the Caribbean due to nutrient-rich waters and lack of predators, the species has spread tremendously. A single lionfish, located on a reef, reduced young juvenile reef fish populations by 79%.</p>
House mouse	<p>The house mouse (<i>Mus musculus</i>) is a small mammal of the order Rodentia, characteristically having a pointed snout, small rounded ears, and a long naked or almost hairless tail. It is one of the most numerous species of the genus <i>Mus</i>. Although a wild animal, the house mouse mainly lives in association with humans. House mice usually live in proximity to humans, in or around houses or fields. Originally native to Asia (probably northern India), they spread to the eastern Mediterranean about 13,000 BC, only spreading into the rest of Europe around 1000 BC. This time lag is thought to be because the mice require agrarian human settlements above a certain size. They have since been spread to all parts of the globe by humans. Mice have become an invasive species on islands to where they have spread during the period of European exploration and colonisation. New Zealand had no land mammals other than the lesser short-tailed bat (<i>Mystacina tuberculata</i>) prior to human occupation, and the house mouse is one of many species that have been introduced. Mice are responsible for a reduction in native bird species since they eat some of the same foods as birds. They are also known to kill lizards and have a large effect on native insects. Gough Island in the South Atlantic is used by 20 species of seabirds for breeding, including almost all of the world's Tristan albatross (<i>Diomedea dabbenena</i>) and Atlantic petrel (<i>Pterodroma incerta</i>). Until house mice arrived on the island in the 19th century with sailors, the birds did not have any mammalian predators. The mice have since grown unusually large and have learned to attack albatross chicks, which can be nearly 1 m tall, but are largely immobile, by working in groups and gnawing on them until they bleed to death. In the grain belt of south-eastern Australia, the introduced species <i>Mus domesticus</i> breed so successfully, every three years or so they reach plague proportions, achieving densities of 1000 per hectare and causing massive disruption to communities, and losses to agriculture of A\$36 million annually.</p>
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Other Flora and Fauna Issues

Abusively incorporating faunae into photos and videos to post on social media has now become a frequent occurrence. And although these abuses were common long before the advent of social media, this new form of socialization has actually helped to not only expose these self-incriminating boasting morons who commit these

horrendous acts, but to also make the world more aware of this issue and demand justice. In May 2017, two individuals in South Carolina abducted a wild juvenile alligator that was crossing the road and forcibly poured beer and blew smoke down the alligator's throat while taking selfies. (343) In July 2017, a video was posted online of a shark being dragged senselessly behind a speeding boat with the boat occupants laughing and joking in the background. (449) In July 2017, an Iranian man was filmed riding on an endangered whale shark and posted online. (489) Several teens killed and mutilated several albatross and their nests in 2017, one of the teens was sentenced to 45 days in jail and 200 hours of community service, the other teens involved were minors at the time and will be tried in a closed court. (400) If *Homo sapiens* look at flora and fauna as nothing more than a decoration or some form of destructive entertainment, how will they ever respect and coexist with other species? How many more thousands of similar instances of murder have occurred resulting in the death of the flora or fauna? How many flora and fauna have been killed all to create a photo or video? Why do the few environmental laws which offenders are prosecuted under have such lenient punishments? Why is a murderer of *Homo sapiens* given life in prison and sometimes even a death sentence, while the murderer of nature only sometimes is given a fine and perhaps a few months in jail? Will nature ever be given the same or similar protections and legal rights to life as *Homo sapiens*?

Honeybee population numbers began to rapidly decline around 2006, a phenomenon known as colony collapse disorder, and while no exact cause has yet to be identified, it has been suggested that the cause may be from pathogens, genetic factors, habitat loss, *Varroa* and *Acarapis* mites, pesticides, global warming, or a combination of these negative impacts. Many other fauna like native bees, butterflies, birds, bats, and other fauna also pollinate some flora species, but in ecosystems throughout the world pollinator decline has been occurring since the end of the 20th century. It became such a concern, that in June 2014 the Obama administration published a fact sheet titled '*The Economic Challenge Posed by Declining Pollinator Populations*' and recommended \$50,000,000 for research and to strengthen pollinator habitats.

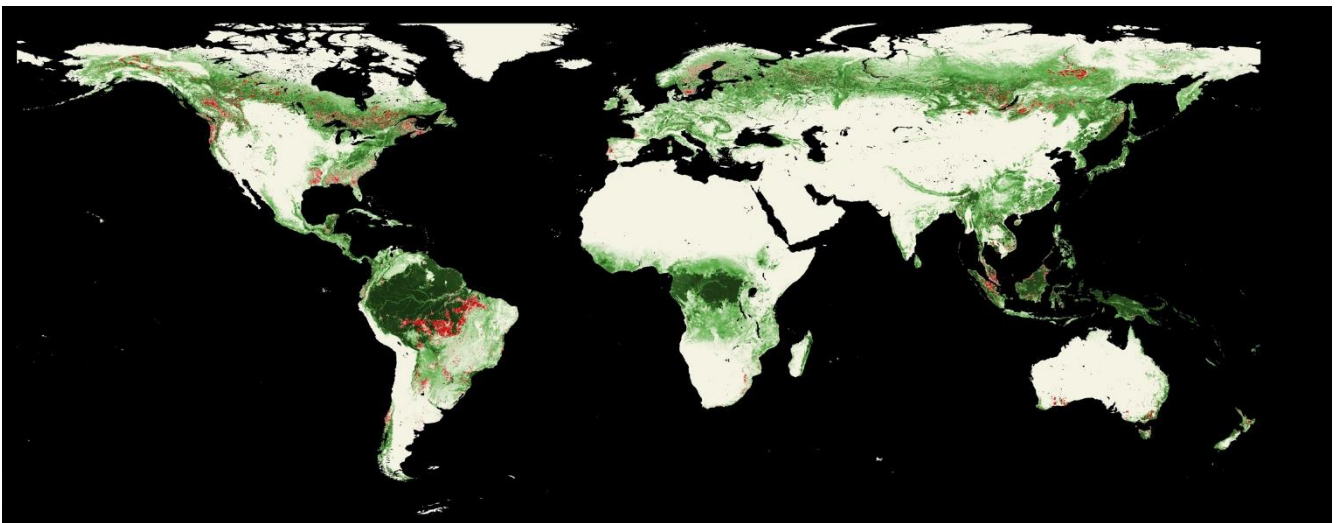
In 2017, Thailand veterinarians removed 915 coins from inside a captive 25-year-old turtle's stomach and intestine. Tourist had thrown the coins into the turtle's pond for good luck over the years and the turtle consumed them. (379) How many fish and other aquatic fauna have also consumed coins as a result of this antiquated good luck custom?

Forests

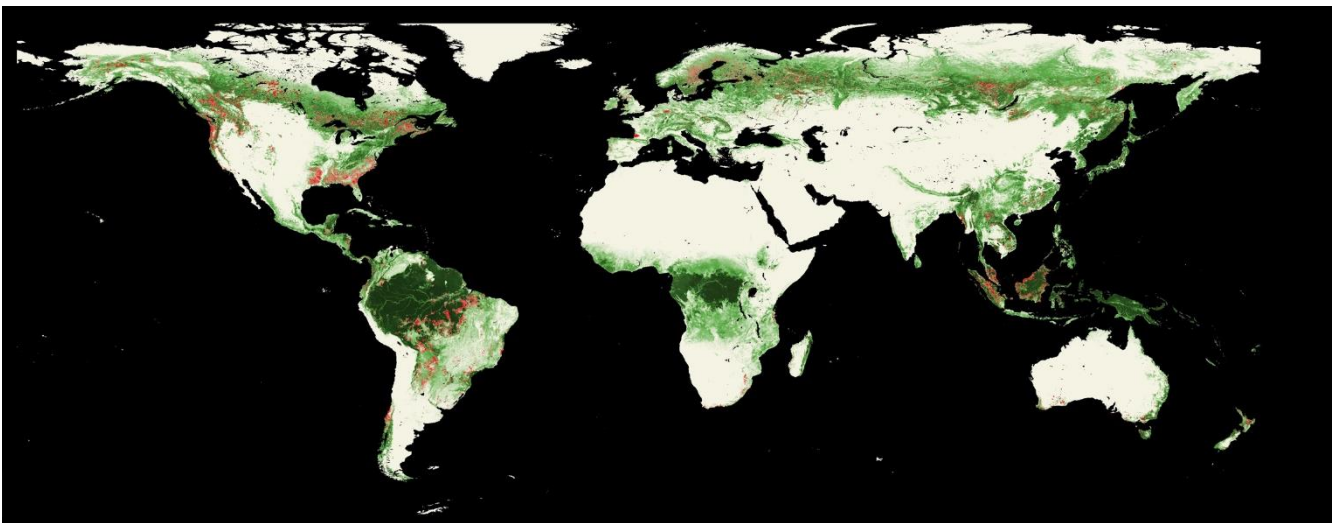
Homo sapiens have been deforesting the Earth for thousands of years in their attempts to control nature and while over-exploiting the forests. 2,000 years ago, ancient civilizations deforested many parts of Europe, and Easter Island flora were also decimated by natives. In the United States, the gigantic old growth pine forests were wiped out in around 100 years to build America, and very little old growth pine forest remains today. The virgin Mississippi River bank forests were decimated to power steamboats, and the great plains cleared for agricultural use. While some has been preserved, much of the old-growth forests worldwide have already been logged, and a very small portion remains today. It is a tragic when one thinks of how Earth was just a few hundred years ago, and what flora and fauna were lost due to the logging, mining, pollution, and other anthropogenic depredations. Some might postulate, that sure *Homo sapiens* harvested 90% of the old-growth forest in the United States, but look at it now, how many of the trees have come back and the forest is like it was. But looks can be deceiving, and it is in fact not the same, as no one knows what flora and fauna species lived under the canopy, some even endemic, which were lost, because the ecosystem was never thoroughly studied and the species were never even documented before the ecosystem was decimated.

In 2017, the Earth was estimated to have 3,040,000,000,000 trees with an annual loss of 15,000,000,000 trees per year, at this rate it will take only another 203 years before there will be no trees left on Earth. Since the dawn of civilization, the global number of trees has fallen by 46%. (237) Globally between 2000 and 2012, there were 888,000 square miles of forest lost, and 309,000 square miles of forest that regrew. During this same timeframe, Brazil cut its deforestation rate by half, from 15,400 square miles per year to 7,700 square miles, while the deforestation rate in other countries like Indonesia doubled, from 3,900 square miles per year between 2000 and 2003, to more than 7,700 square miles between 2011 and 2012. (468)

A 2016 study on deforestation concluded that 1,274,137 square miles, or 1/10, of the Earth's forest have been lost since the early 1990s. The greatest losses were seen in South America, which had a 30% decline in wilderness area, and Africa which had a loss of 14%. (217) It is estimated that 90% of coastal rainforest in West Africa have been destroyed since 1900, and in South Asia 90% of the rainforests have been lost. In Central America, 70% of lowland tropical forests have been lost since 1950, while 95% of Mata Atlântica rainforest in Brazil has been lost. Madagascar has lost 90% of its eastern rainforests, and less than 1% of Haiti's rainforests remain. In addition, Mexico, India, the Philippines, Indonesia, Thailand, Burma, Malaysia, Bangladesh, China, Sri Lanka, Laos, Nigeria, the Democratic Republic of the Congo, Liberia, Guinea, Ghana, and the Ivory Coast have all lost large portions of their virgin rainforest. This has resulted in a wide range of environmental problems like: species extinctions, habitat loss, bio-diversity loss, desertification, soil erosion, sequestered carbon being released, and other negative environmental impacts. Deforestation has also led to the displacement of indigenous *Homo sapiens* who have inhabited the lands for thousands of years. As they have no rights in many countries, and some have little to no education, they are easily moved and exploited by governments and corporations.



SOURCE: NASA - Areas of forest cover loss (in red) during the period 2000-2005. Background image is the percent of forest cover in the year 2000, from MODIS data. <https://svs.gsfc.nasa.gov/10872>



SOURCE: NASA - Areas of forest cover loss (in red) during the period 2005-2010. Background image is the percent of forest cover in the year 2000, from MODIS data. <https://svs.gsfc.nasa.gov/10872>

Ancient and Other Trees Possibly Killed by Global warming or Direct Anthropogenic Activities	
Tree Name / Date	Description

Liberty Tree – 1775	The Liberty Tree (1646–1775) was a famous elm tree that stood in Boston near Boston Common, in the years before the American Revolution (1776–1783). In 1765, colonists in Boston staged the first act of defiance against the British government at the tree. The tree became a rallying point for the growing resistance to the rule of Britain over the American colonies and for that reason it was felled by riotous American Tories in 1775.
The Mother of the Forest – 1854	<p>The Mother of the Forest (667 BCE – 1854 CE) was an ancient and huge Sequoiadendron tree. The tree lived in the Sierra Nevada Mountains in eastern central California, United States. At the time of the California Gold Rush, people were searching California for undiscovered riches. As photography wasn't developed enough yet to satisfy people's curiosity, trees were felled and transported to big cities to prove their existence at great costs. In 1854 after unsuccessful exhibitions of the Discovery Tree, William Lapham, George L. Trask and George Gale set about to have the bark from the trunk of the Mother of the Forest removed, ready to be reassembled at exhibitions. Workers made holes in the tree using pump-augers, and inserted rods into the holes to support the weight of the scaffolding and the workers while the bark was sawed off. Over 90 days, 60 tons of bark was removed in 8 feet (2.4 m) high and 2 to 5 feet (0.61 to 1.52 m) wide sections up to the height of 116 feet (35 m). Gale sent samples of the tree to foresters in the east where it was discovered to be 2,520 years old.</p> <p>The removed sections of the bark were shipped by sea around Cape Horn to New York, where they were reassembled in 1855 in the shape of the tree for a "vegetable wonders of the gold regions" exhibition in the New York Crystal Palace. After New York, the bark was shipped in 1856 to London, where the sections accommodated by the building in Hyde Park attracted so much attention that all the sections were placed in their full length permanently in the The Crystal Palace in London's Sydenham the next year. It was presented to the public as the trunk of a 3,000 year old tree, and was a financial success. It stayed there until the nave of the palace, along with the bark and other exhibits, were destroyed in a fire in 1866. The Mother of the Forest in Calaveras Grove did not survive for long once the bark had been removed. In 1856 the tree still had full foliage, but within five years no leaves remained.</p>
Mingo Oak – 1938	The Mingo Oak in the U.S. state of West Virginia. First recognized for its age and size in 1931, the Mingo Oak was the oldest and largest living white oak tree in the world until its death in 1938. In the summer of 1937, the Mingo Oak scarcely sprouted leaves on only a couple of its branches. In February 1938, biologist Earl M. Vanscoy wrote in Castanea that the tree was "almost dead" due to the release of poisonous gases and sulfur fumes from a coal spoil tip of the Island Creek Coal Company, which had been burning nearby in Trace Gap. In the spring of 1938, the tree failed to produce any leaves. White oaks flower in the spring at approximately the same time as their leaves form, between late March and late May. On May 4, 1938, West Virginia's state forester, D. B. Griffin, announced that the Mingo Oak was dead. Griffin also noted that a fungus that only lived on dead or dying trees had been present on the tree for several months prior to its death. The prevailing theory is that the tree died as a result of suffocation from the fumes of the burning pile of coal waste; however, local media initially reported that the tree was killed as a result of fungal growth.
Prometheus – 1964	Prometheus (recorded as WPN-114) was the oldest known non-clonal organism, a Great Basin bristlecone pine (<i>Pinus longaeva</i>) tree growing near the tree line on Wheeler Peak in eastern Nevada, United States. The tree, which was at least 4862 years old and possibly more than 5000, was cut down in 1964 by a graduate student and United States Forest Service personnel for research purposes
Logan Tree – 1964	The Logan Elm that stood near Circleville in Pickaway County, Ohio, was one of the largest American elm trees (<i>Ulmus americana</i>) recorded. The 65-foot-tall (20 m) tree had a trunk circumference of 24 feet (7.3 m) and a crown spread of 180 feet (55 m). Chief Logan of the Mingo tribe delivered a passionate speech at a peace-treaty meeting under this elm in 1774. Weakened by Dutch Elm Disease, the tree died from storm damage in 1964.
Wawona Tree – 1969	The Wawona Tree, also known as the Wawona Tunnel Tree, was a famous giant sequoia that stood in Mariposa Grove, Yosemite National Park, California, USA, until February 1969. A tunnel was cut through the tree in 1881, enlarging an existing fire scar. Two men, the Scribner brothers, were paid \$75 for the job (equivalent to \$1,861 in 2016). The tree had a slight lean, which increased when the tunnel was completed. It had a height of 227 feet (69 m) and was 26 feet (7.9 m) in diameter at the base The Wawona Tree fell in February 1969 under a heavy load of snow on its crown. The giant sequoia is estimated to have been 2,300 years old.
The Axe Murder Incident – 1976	<p>The axe murder incident was the killing of two United States Army officers, Arthur Bonifas and Mark Barrett, by North Korean soldiers on August 18, 1976, in the Joint Security Area (JSA) located in the Korean Demilitarized Zone (DMZ). The U.S. Army officers had been part of a work party cutting down a poplar tree in the JSA that partially blocked the view of United Nations (U.N.) observers when they were assaulted by the North Koreans, who claimed that the tree was planted by Kim Il-Sung, and killed them. Three days later, American and South Korean forces launched Operation Paul Bunyan, an operation that cut down the tree with a show of force to intimidate North Korea into backing down, which it did. North Korea then accepted responsibility for the earlier killings.</p> <p>Operation Paul Bunyan was carried out on August 21 at 07:00, three days after the killings. A convoy of 23 American and South Korean vehicles ("Task Force Vierra", named after Lieutenant Colonel Victor S. Vierra, commander of the United States Army Support Group) drove into the JSA without warning to the North</p>

	<p>Koreans, who had one observation post manned at that hour. In the vehicles were two eight-man teams of military engineers (from the 2nd Engineer Battalion, 2nd Infantry Division) equipped with chain-saws to cut down the tree.</p> <p>These teams were accompanied by two 30-man security platoons from the Joint Security Force, who were armed with pistols and axe handles. The 2nd Platoon secured the northern entrance to the JSA via the Bridge of No Return, while the 3rd Platoon secured the southern edge of the area.</p> <p>A U.S. Infantry company in 20 utility helicopters and seven Cobra attack helicopters circled behind them. Behind these helicopters, B-52 Stratofortresses, which some described as "nuclear ready" came from Guam escorted by U.S. F-4 Phantom IIs from Kunsan Air Base and South Korean F-5 and F-86 fighters were visible flying across the sky at high altitude. At Taegu Air Base, F-111 bombers of the 366th Tactical Fighter Wing out of Mountain Home Air Force Base, were stationed, and F-4 Phantoms C and D from the 18th TFW Kadena Air Base and Clark Air Base were also deployed. The aircraft carrier USS Midway task force had also been moved to a station just offshore.</p> <p>Near the edges of the DMZ, many more heavily armed U.S. and South Korean infantry, artillery including the Second Battalion, 71st Air Defense Regiment armed with Improved Hawk missiles, and armor were waiting to back up the special operations team. Bases near the DMZ were prepared for demolition in the case of a military response. The defense condition (DEFCON) was elevated on order of General Stilwell, as recounted in Colonel De LaTeur's research paper later. In addition, 12,000 additional troops were ordered to Korea, including 1,800 Marines from Okinawa. During the operation, nuclear-capable strategic bombers circled over the JSA. According to an intelligence analyst monitoring the North Korea tactical radio net, the accumulation of force "blew their... minds".</p> <p>Altogether, Task Force Vierra consisted of 813 men: almost all of the men of the United States Army Support Group, of which the Joint Security Force was a part; a South Korean reconnaissance company; a South Korean Special Forces company which had infiltrated the river area by the bridge the night before; and members of a reinforced composite rifle company from the 9th Infantry Regiment. In addition to this force, every UNC force in the rest of South Korea was on battle alert.</p> <p>The engineers in the convoy — two teams from B Company and C Company, 2nd Engineer Battalion, led by First Lieutenant Patrick Ono, who had conducted a recon of the tree, disguised as a Korean corporal two days prior — left their vehicles once the convoy arrived, and immediately started cutting down the tree while standing on the roof of their truck, while the 2nd Platoon truck was positioned to block the Bridge of No Return. The remainder of the task force dispersed to their assigned areas around the tree and assumed their roles of guarding the engineers.</p> <p>North Korea quickly responded with about 150–200 troops, armed with machine guns and assault rifles. The North Korean troops arrived mostly in buses but did not leave them at first, watching the events unfold. Upon seeing their arrival, Lieutenant Colonel Vierra relayed a radio communication, whereupon the helicopters and air force jets became visible over the horizon. At the Yokota Air Base in Japan, the base was on alert. The flight-line runway was "nose to tail" with a dozen C-130s ready to provide back-up. The North Koreans quickly got out of their buses and began setting up two-man machine gun positions, where they watched in silence as the tree was felled in 42 minutes (3 minutes fewer than Stilwell's estimate), avoiding a violent confrontation. Also removed were two road barriers installed by the North Koreans, while the South Korean troops also vandalised two North Korean guard posts. The tree stump, around 6 m (20 ft) tall, was deliberately left standing.</p>
Beaman Oak – 1989	The Beaman Oak was the largest white oak tree in the Commonwealth of Massachusetts. It stood in the front yard of a colonial era three-story house in the town of Lancaster. After a storm severely damaged it, the tree was cut down in 1989.
Pine of Tsar Dušan – 1999	Pine of Tsar Dušan was a giant black pine tree located in the courtyard of the old Serbian Orthodox Monastery of the Holy Archangels, in the village cemetery in Gornje Nerodimlje, Uroševac, Kosovo. The pine tree was planted in 1336 by Emperor Dušan and cut down and burned in a revenge attack by local Albanian villagers returning from exile in 1999.
Kiikd'yaas Tree – 1997	<p>Kiikd'yaas, also known as the Golden Spruce, was a Sitka Spruce tree (<i>Picea sitchensis</i> 'Aurea') that grew on the banks of the Yakoun River on the Haida Gwaii archipelago, in British Columbia Canada. It had a rare genetic mutation that caused its needles to be golden in colour (rather than the usual green). Kiikd'yaas was considered sacred by the Haida people.</p> <p>In January 1997, 47-year-old unemployed forest engineer Grant Hadwin travelled to Haida Gwaii and purchased a chainsaw and other felling equipment. Early on the morning of January 20, 1997 he swam across the freezing Yakoun River (with all of his equipment, in the middle of the night, in mid-winter) and made a series of strategic deep cuts in Kiikd'yaas. The cuts were designed to leave Kiikd'yaas standing but weakened, so that it would be knocked over by the next strong winds. The tree fell two days later.</p>

	<p>After cutting down the tree, Hadwin left the islands for Prince Rupert, British Columbia. He sent a fax to the media and the Haida nation claiming responsibility for the act, saying that he was motivated by "rage and hatred towards university trained professionals and their extremist supporters". The act outraged people throughout Canada and received extensive media coverage. Hadwin was arrested, ordered to return to Haida Gwaii to stand trial, and released on bail.</p> <p>Hadwin planned to travel to his trial date by crossing the notoriously stormy and violent Hecate Strait (from Prince Rupert to Masset) alone by kayak in mid-winter. He departed Prince Rupert in February 1997 but never arrived at his trial. What is believed to be Hadwin's broken kayak and effects were found on Mary Island in June 1997. Whether he had been murdered for his crime, accidentally drowned, or left his belongings behind and fled into the wilderness is not known. Because Hadwin was known to be an expert in wilderness survival and to have an exceptional tolerance for the cold, some people believe that Hadwin faked his own death and vanished into the wilderness. His fate remains unknown.</p>
Alishan Sacred Tree – 1997	The 3000-year-old tree collapsed on July 1, 1997 in Taiwan, following heavy rainstorms.
Encino Oak Tree – 1998	The Encino Oak Tree, also known as the Lang Oak, was a 1,000-year-old California live oak tree, <i>Quercus agrifolia</i> , in the Encino section of Los Angeles, California. By the 1990s, the tree was in a weakened condition. Some attributed its condition to the Encino Reservoir, built in 1921, for cutting off the natural water flow to the tree. Others blamed it on air pollution from traffic on nearby Ventura Boulevard. It also suffered from oak-root fungus. In 1991, it was diagnosed with slime flux, a tree ailment caused by bacteria that generate fermentation inside the tree and send toxic sap oozing through the bark. Arborists reported that the tree desperately needed special care to save it. Arborists and city officials argued over the proper treatment for the ailing tree, with one arborist suggesting the city chisel small holes in the bark to release the toxic sap that was slowly killing the oak. Others suggested the drilling would put too much stress on the tree, which should be allowed to heal itself. Efforts to save the ailing oak became a publicized cause. In 1996, the Times reported on the oak: "His skin is mottled, some of his limbs are held together with pins, and his great, shaggy head hangs from its own weight. Old Lang is in trouble." On February 7, 1998, an El Niño storm "delivered the death blow, felling the ailing tree with storm winds
Wye Oak – 2002	The Wye Oak was the largest white oak tree in the United States and the State Tree of Maryland from 1941 until its demise in 2002. Wye Oak State Park preserves the site where the revered tree stood for more than 400 years in the town of Wye Mills, Talbot County, Maryland. The Wye Oak was believed to be over 460 years old at the time of its destruction during a severe thunderstorm on June 6, 2002.
Tree of Knowledge – 2006	The Tree of Knowledge is a heritage-listed tree in Oak Street, Barcaldine, Barcaldine Region, Queensland, Australia. It was a 200-year-old <i>Corymbia aparrrerinja</i> ghost gum. In 2006, in an act of vandalism, the tree was poisoned with glyphosate (a main ingredient in the herbicide RoundUp). An arborist declared the tree dead on 3 October 2006.
Herbie Elm Tree – 2010	"Herbie" was an American elm tree located in Yarmouth, Maine, USA. It stood by present-day East Main Street (State Route 88), at its intersection with Yankee Drive, between 1793 and January 19, 2010. At 110 feet in height, it was, between 1997 and the date of its felling, the oldest and largest of its kind in New England. On May 1 1834, the town gave Herbie some company by planting rows of elm trees along East Elm Street. From 1957 onward, however, most of them succumbed to Dutch elm disease. As of 2003, only twenty of Yarmouth's original 739 elms had survived. A section of Herbie's stump, pictured in May 2010, is prepared for removal. A stump grinder removed the remainder at the end of the month. The above section on display at the 2010 Yarmouth Clam Festival. It is now on permanent display on Cleaves Street, on the property of Yarmouth's town hall. After battling fifteen bouts of Dutch elm disease, in 2007, stripes appeared under the tree's bark, indicating a worsening condition. In August 2009, it was revealed that Herbie would be cut down on January 18 and 19 2010.
Auburn Oak Trees – 2010	In 1937 two live oak trees were planted at Auburn University, a tradition of rolling the trees with toilet paper began in the late 1960s. In 2010 an irate fan from rival Alabama Crimson Tide poisoned the trees with an herbicide called Spike 80DF which ultimately killed the trees. How much toilet paper was wasted over the last 50 years doing this pointless tradition? If this tradition was not done, would the trees have ever been targeted and poisoned?
The Anne Frank Tree – 2010	The Anne Frank tree was a horse-chestnut tree (<i>Aesculus hippocastanum</i>) in the city center of Amsterdam that was featured in Anne Frank's <i>The Diary of a Young Girl</i> . Anne Frank described the tree from The Annexe, the building where she and her family were hiding from the Nazis during World War II. Over the years, the tree deteriorated significantly due to both a fungus and a moth infestation. The Borough Amsterdam Centrum declared that the tree had to be cut down on 20 November 2007 due to the risk that it could otherwise fall down, but on 21 November 2007 a judge issued a temporary injunction stopping the removal. The Foundation and the neighbours developed an alternative plan to save the tree. The neighbours and supporters formed the Foundation Support Anne Frank Tree which carried out the suggested supporting construction and took over the maintenance of the tree. On 23 August 2010, the tree was blown down by high winds during a storm, breaking off approximately 1 metre (3.3 ft) above ground. The tree was estimated to be between 150 and 170 years old.
Webster Sycamore –	The Webster Sycamore was an American sycamore (<i>Platanus occidentalis</i>) in the U.S. state of West Virginia.

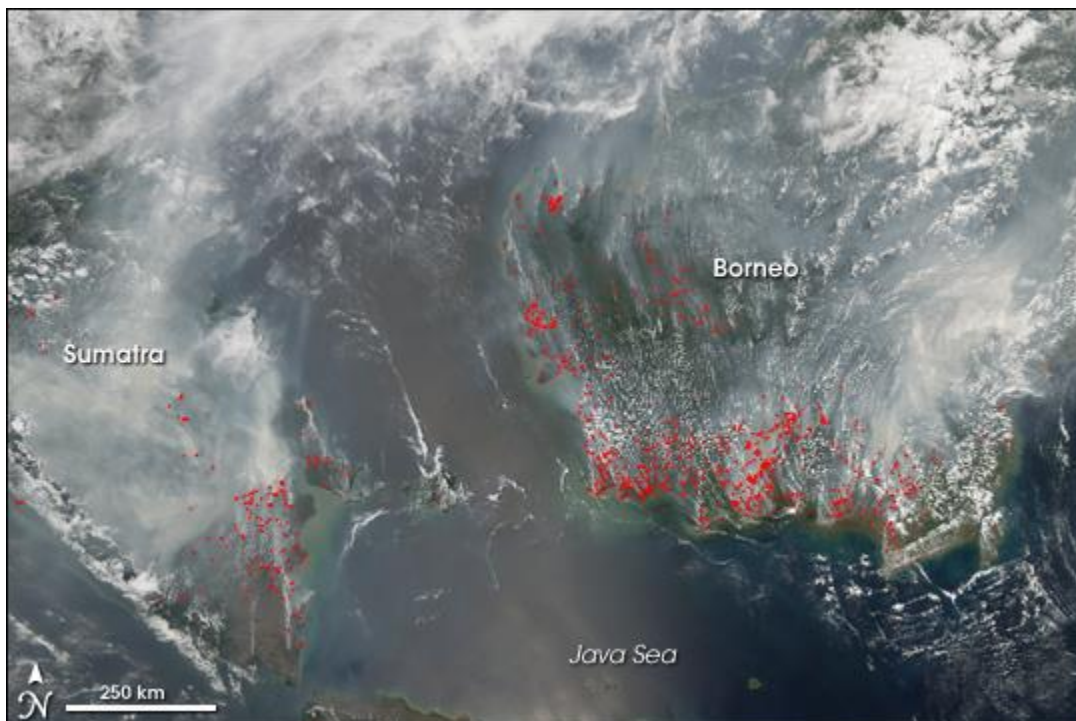
2010	Long recognized for its size, the Webster Sycamore was the largest living American sycamore tree in West Virginia until its felling in 2010. On September 3, 2007, a malicious fire was set in the base of the Webster Sycamore's trunk. The tree survived the blaze, but suffered irreparable damage. The West Virginia Division of Forestry performed a safety and risk assessment of the tree, and determined that structural mitigation was not feasible, and that the Webster Sycamore was to be "considered an extreme hazard". In January 2008, a 17-year-old suspect from Bergoo was formally charged with a felony count of arson for setting fire to the tree. Following the fire, experts recommended that the Webster Sycamore be felled or fenced off as a safety measure. According to the Division of Forestry, the tree was finally brought down during the summer of 2010. At the time of its death, the tree was estimated to be over 500 years old.
The Senator – 2012	The Senator was the biggest and oldest bald cypress tree in the world, located in Big Tree Park, Longwood, Florida. At the time of its demise, it was 125 feet (38 m) tall, with a trunk diameter of 17.5 feet (5.3 m). The tree was thought to have been destroyed by a fire from a lightning strike, but it was later discovered that the fire was started by an arsonist.
Eisenhower Tree – 2014	The Eisenhower Tree was a loblolly pine located on the Augusta National Golf Club in Augusta, Georgia. In the 1950s, it was named after then-U.S. President Dwight D. Eisenhower who unsuccessfully lobbied to have it taken down after it interfered with his golf game. Due to its size, history, and location on a prominent golf course, it is considered iconic of the Augusta golf course and is one of the most famous trees in American golf. In February 2014, the tree was removed after suffering extensive damage from a major ice storm.
Balmville Tree – 2015	The Balmville Tree was an old-growth eastern cottonwood growing at the intersection of River Road, Balmville Road and Commonwealth Avenue in Balmville, New York, a hamlet within the Town of Newburgh. It was the oldest tree of that species in the Eastern United States. Core samples of the tree dated its birth to the year 1699. It once reached as high as 110 feet (33.5 m), but its crown had to be trimmed after extensive damage from Hurricane Floyd in 1999. On August 5, 2015, the tree was cut down and removed by the New York State Department of Environmental Protection, which cited safety concerns.
Big Tree – 2015	The Big Tree (also known as the Trout Lake Big Tree) was a massive Ponderosa pine tree in old growth pine and fir forest in southern Washington state, at the southern base of Mount Adams. The tree was 202 feet (62 m) tall with a diameter of 7 feet (210 cm), and was one of the largest known ponderosa pine trees in the world. It had been stressed by attacks from mountain pine beetles and its death in 2015 was confirmed the following year.
Pioneer Cabin Tree – 2017	<p>The Pioneer Cabin Tree fell during a rain storm and flooding on January 8, 2017. It was the strongest storm to hit the area in over a decade. The flooding, combined with the shallow root system of giant sequoias, likely caused it to fall. A park volunteer reported that the tree had been weakening, becoming brittle and leaning to one side for several years, with only a single branch remaining alive. It had been weakened by the severe damage caused by the tunnel carved through its trunk.</p> <p>At least one observer suggested that the tree fell victim to the profit motive and greed, not just a storm. It was one of several trees that were mutilated to promote tourism. California State Parks supervising ranger Tony Tealdi said that today the hollowing out of a tree would not be permitted.</p> <p>A number of big trees in California had tunnels dug through them in the late 1800s and early 1900s. The tunnel allowed tourists to drive, bike, or walk through the tree. The tunneling inflicted severe damage to the health and strength of the trees. The tunnels were cut to stimulate automobile tourism; the cutters did not know or care about the profound damage they were inflicting on the trees. Because of the damaging effects of carving through trees, the trend of creating tunnel trees has long passed.</p>
African baobabs	Some of the African baobabs, which is the biggest and longest-living angiosperm tree, have been dying from unknown causes, although significant modifications of climate conditions is suspected. A recent study found that 9 of the 13 oldest and 5 of the 6 largest African baobab trees have died, or at least their oldest parts have collapsed and died over the last 12 years. (163)
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Why have so many of some of the world's oldest living organisms died without much notice? If left undisturbed and allowed to grow without anthropogenic interference, will ancient trees inhabit the Earth in another 1,000 to 3,000 years? Some savagely desecrate trees to express a gesture of love or another emotion, or to engage in the barbaric ritual of marking one's territory by carving initials, names, other words, or symbols into the trunks or branches of trees. Is this really the best way to symbolize emotion? Isn't it really nothing more than the desecration of a living thing? Every 6 years for the last 1,200 years, participants of the Japanese Onbashira festival have chopped down 16 fir trees and dragged them through the forest to create a ceremonial pillar. Would these 3,200 trees not have been more beneficial as living trees producing oxygen instead of some ritualistic pillar? How many other flora and fauna were destroyed during the process of dragging these logs through the ecosystem?

Not all those who have engaged in forms of deforestation in the past are as cold-hearted and detached as most are today. The Maya were well aware of the destruction to Earth they were committing with even minor deforestation, and actually prayed to the gods to show their remorse. J. Eric S. Thompson wrote,

“In the first prayer the words “I am about to damage you” bring out the Maya’s realization that in cutting down the forest he is doing harm to the surface of the earth, to the face of the earth god, Huitz-Hok, the mountain-valley god, the Mopan equivalent of Tzultacah. Another prayer refers to damaging the god’s face. It has been affirmed that no primitive people has an appreciation of the beauty of nature, but I sometimes wonder how true that is. Here one might claim that the milpa-maker is merely apologizing for the physical damage he is about to do to the face of the earth god, but I think that beyond this he is apologizing for the scars he is inflicting on beauty, and that in converting a piece of forest with its trees, its lianas, and its bromelias, almost all of which have a name and a use, into a brown expanse of dead foliage and fallen tree trunks, he is well aware that he is destroying beauty.” (663)

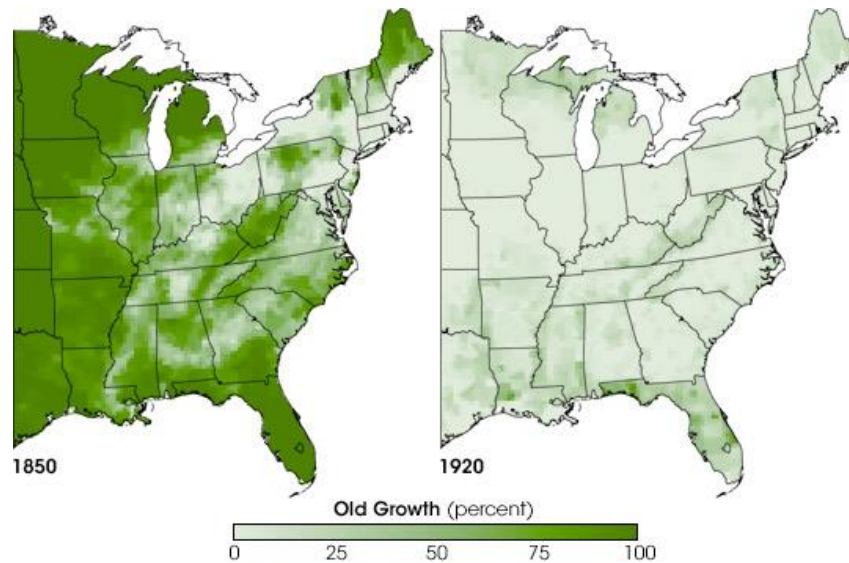
World population growth has led some *Homo sapiens* to seek resources and land space in formally untouched forests. Virgin forests are slashed and burned, or harvested, and then converted into land for agriculture. Corruption of governments, corporate influence, lack of environmental laws, and too few environmental enforcement officers have allowed for the deforestation of millions of acres of virgin rainforest, ultimately destroying once pristine ecosystems. Palm oil, used for cooking oil, in personal care products, and as a biofuel is a preferred crop because it can produce up to 10 times more oil than soybeans, rapeseed or sunflowers. Demand for palm oil has increased exponentially due to consumers wanting a replacement of the traditionally used unhealthy trans-fat oils. This increased demand has led to severe deforestation in Africa, Papua New Guinea, Colombia, Indonesia, and Malaysia. From 1967 to 2000 forest cleared to produce palm oil in Indonesia expanded from 770 square miles to 12,000 square miles. (85) The Global Forest Change analysis of Landsat images published by Hansen, Potapov, Moore, and Hancher is an excellent continuous data set of forest loss between 2000 and 2016 <http://earthenginepartners.appspot.com/science-2013-global-forest> which anyone can access to visualize exactly how much of the Earth’s forests are currently being lost.



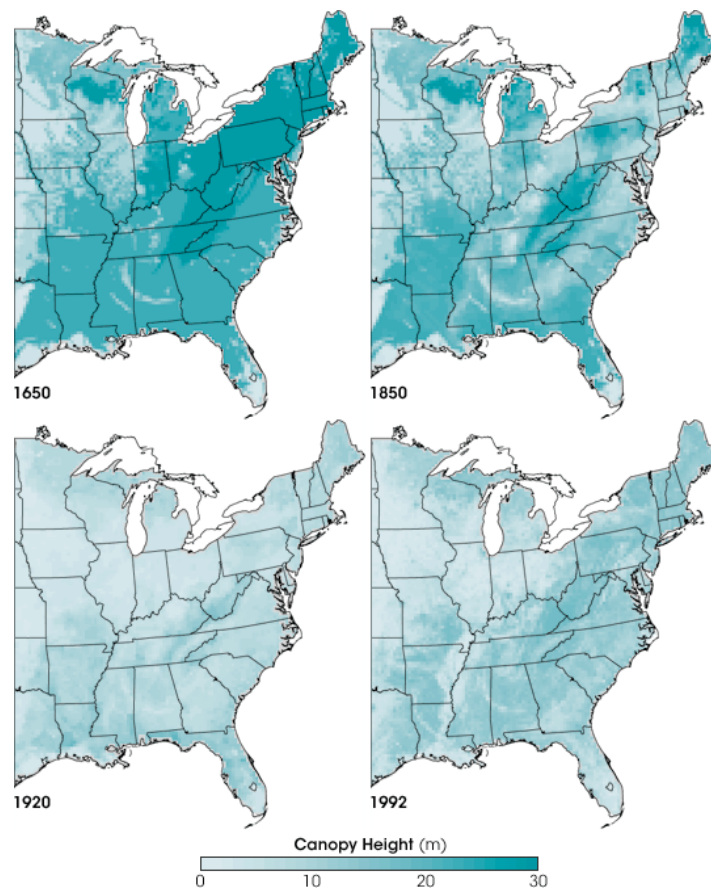
SOURCE: NASA - Smoke from agricultural and forest fires burning on Sumatra (left) and Borneo (right) in late September and early October 2006 blanketed a wide region with smoke that interrupted air and highway travel and pushed air quality to unhealthy levels. This image from the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA’s Aqua satellite on October 1, 2006, shows places where MODIS detected actively burning fires marked in red. Smoke spreads in a gray-white pall to the north.

It took only around 300 years for the Europeans and other settlers to decimate the ancient forests of the United States. And while some of the areas have reverted back to forests, it will never be as pristine as it had been for

thousands of years, and nothing will ever bring back the extinct species which also perished as a result of *Homo sapiens* depredations to these and other ancient forests.

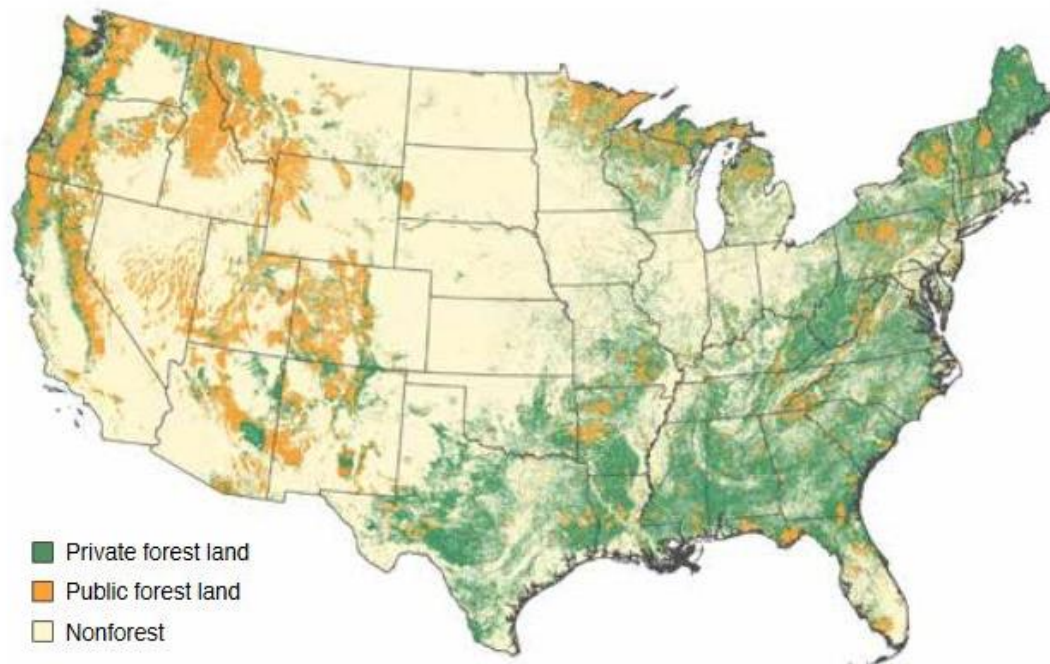


SOURCE: NASA - These maps of landscape disturbance describe how settlers were using the land in the eastern half of the United States in 1850 and 1920. In 1850, native vegetation still covered much of the United States except in the Northeast, but by 1920, very little old growth remained. https://earthobservatory.nasa.gov/Features/AncientForest/ancient_forest6.php



SOURCE: NASA - Changes in canopy height—the height of the tallest layer of vegetation growing in an area—dramatically reveal patterns of land use in the eastern United States. In 1650, the eastern United States was largely covered by tall forest. The forest gradually disappeared and was largely gone by 1920. The forest had started to regrow by 1992, but had not reached pre-settlement heights. (Maps by Jesse Allen and Robert Simmon, based on data from Steyaert and Knox.) - https://earthobservatory.nasa.gov/Features/AncientForest/ancient_forest6.php

In 2017, in the United States, there were some 441,000,000 acres of woods and forest, mostly on the east coast, which were owned and managed by 11,000,000 private owners. Of these, there were 4,000,000 family and individual ownerships, (e.g. families, individuals, trusts, estates, family partnerships, and other unincorporated groups) which held 61% of all private woods and forests. There were 160,000 Corporations which owned 28% of all private woods and forests, and 6% was owned by 42,000 other private owners. (e.g. indigenous *Homo sapiens*, nongovernmental conservation and natural resource organizations, and other non-family unincorporated entities) The remaining 5% are small parcels owned by around 7,000,000 other family and individual type owners. (523)

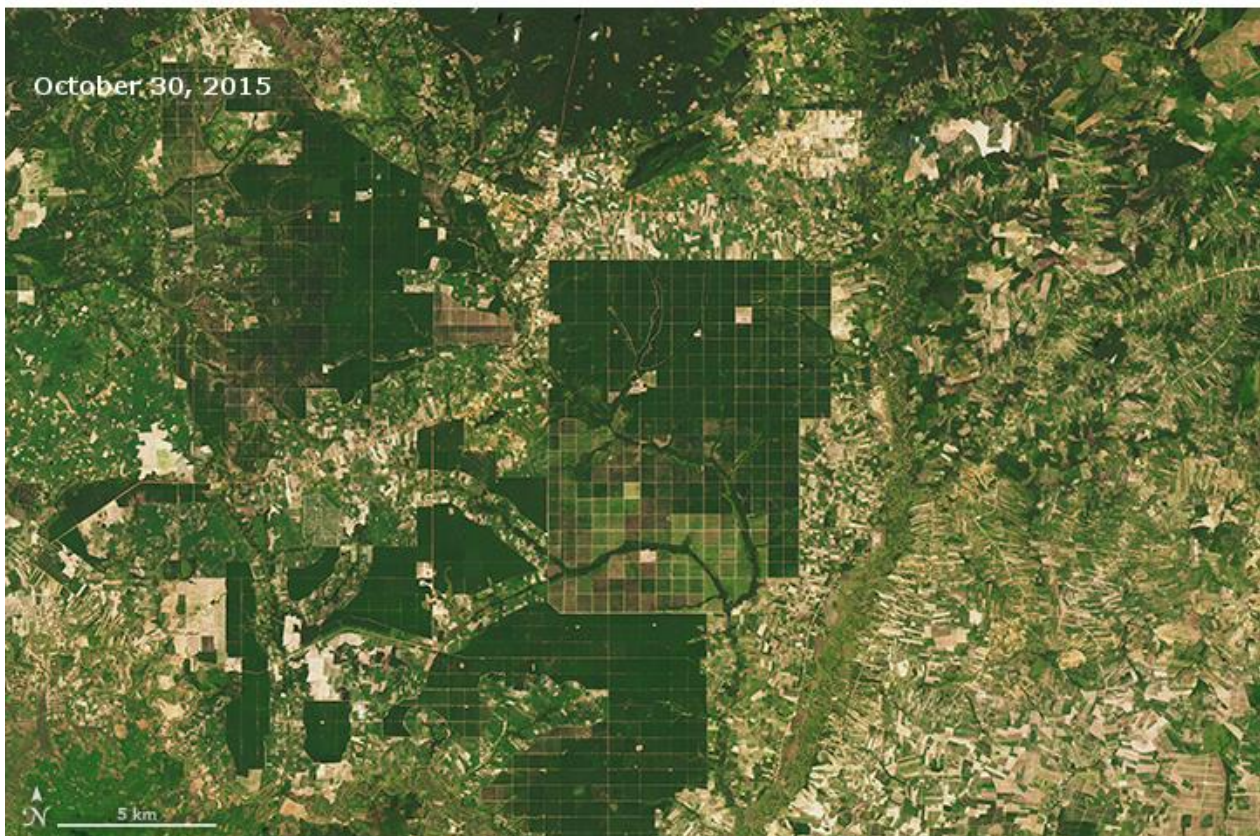


Ownership of woods and forest in the conterminous United States, 2013.



Corporate forest ownership in the conterminous United States, 2013

SOURCE: United States Department of Agriculture - U.S. Forest Service 2011-2013 National Woodland Owner Survey

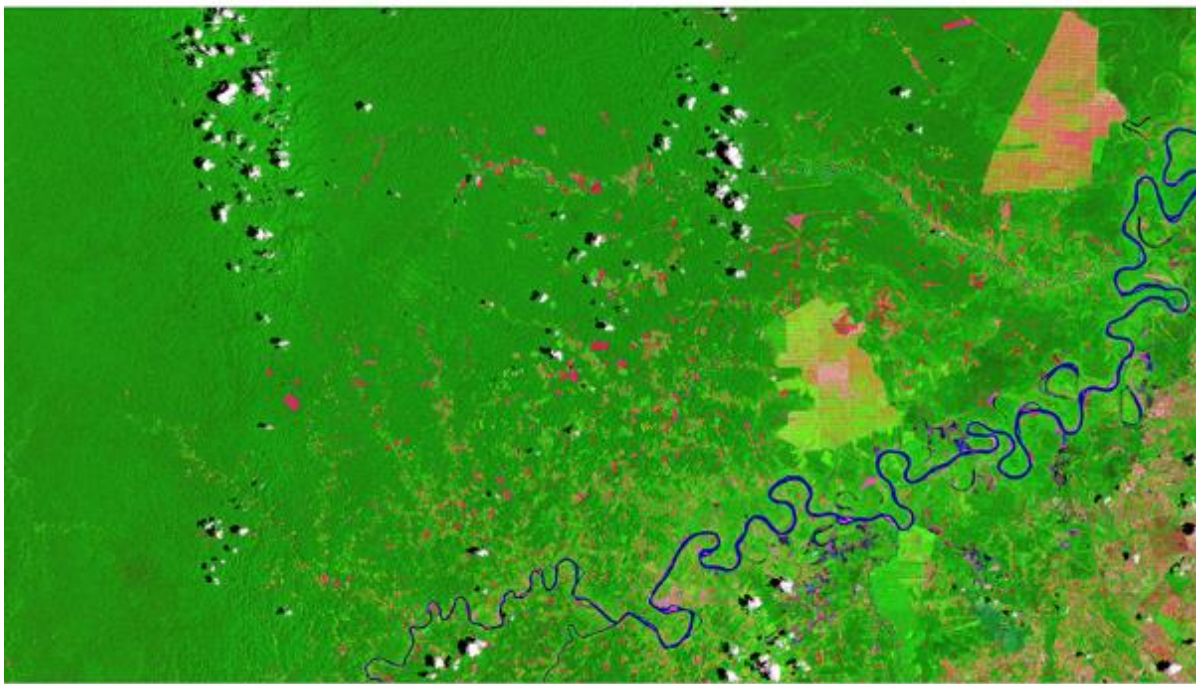


SOURCE: NASA - Cambodia near the border of the Kampong Thom and Kampong Cham provinces - Between 2001 and 2014, the annual forest loss rate in Cambodia increased by 14.4 percent. Put another way, the country lost a total of 1.44 million hectares—or 5,560 square miles—of forest. Other countries with accelerating rates of forest loss include Sierra Leone (12.6 percent), Madagascar (8.3 percent), Uruguay (8.1 percent), and Paraguay (7.7 percent). Top image taken December 31, 2000, bottom image taken October 30, 2015.

November 13, 1986



October 30, 2016



Source: U.S. Geological Survey (USGS) Landsat Missions Gallery: "Monitoring Deforestation in the Amazon"; U.S. Department of the Interior / USGS and NASA. Deforestation near Pucallpa, Peruvian Amazon November 13, 1986 - October 30, 2016 - Large areas within the Amazon rainforest have undergone large-scale deforestation over the past few decades. However, in locations like the Peruvian Amazon, most of the deforestation is caused in recent years by small-scale agriculture, according to the Monitoring of the Andean Amazon Project. These images show land about 25 miles (about 40 kilometers) northwest of Pucallpa along the Aguaytia River. Lush green dominates the 1986 image (left), while deforested land is light green or pink in the 2016 image. Two large-scale oil palm plantations dominate the 2016 image. Images taken by Landsat.

June 24, 1984



August 6, 2011

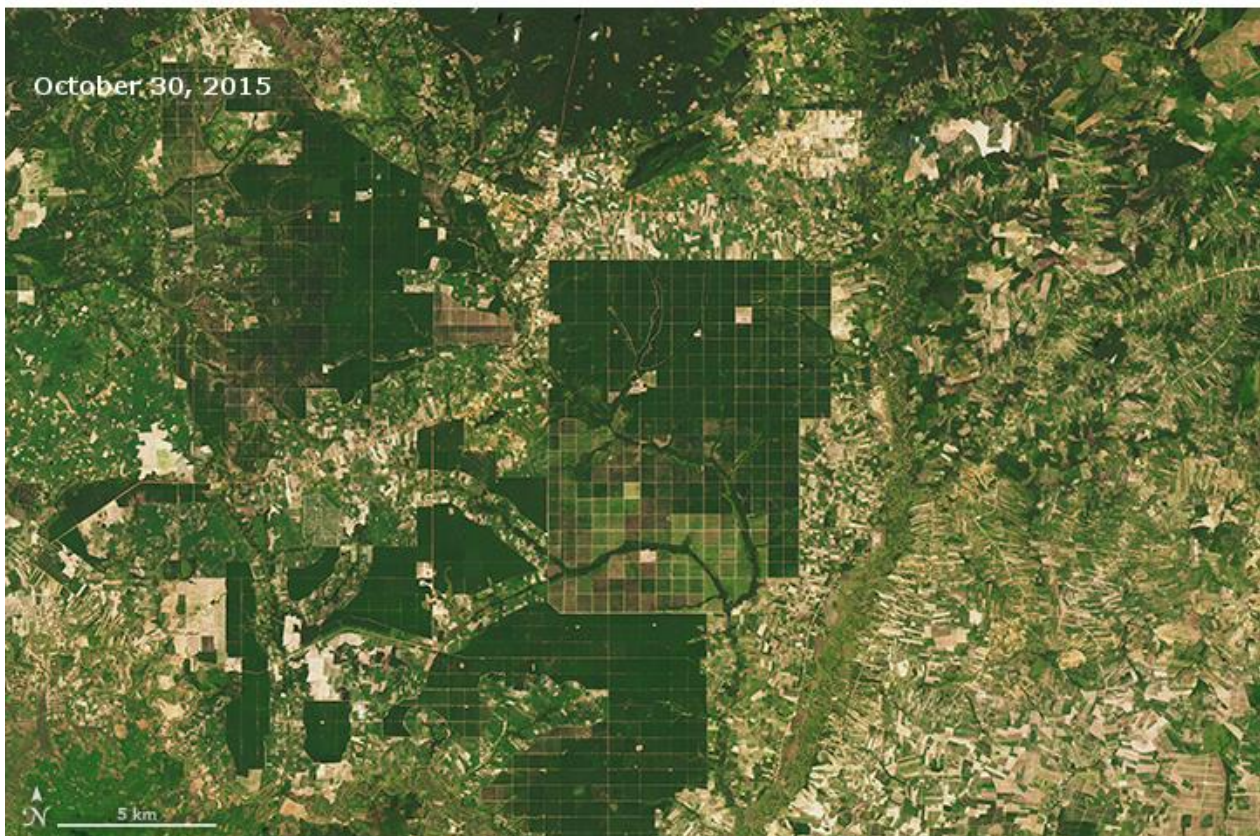


Source: NASA - Images taken by the Thematic Mapper sensor aboard Landsat 5. Source: USGS Landsat Missions Gallery, "Samuel Dam, Rondonia, Brazil," U.S. Department of the Interior / U.S. Geological Survey - Samuel Dam impact / Deforestation in Rondonia, Brazil June 24, 1984 - August 6, 2011 The Samuel Dam is located along the Jamari River in Rondonia, Brazil. These images show the area in 1984, shortly after construction of the hydroelectric dam began, and in 2011. The reservoir created by the dam flooded the upstream forest and displaced many people. Also evident in the images is the deforestation that has affected much of the region.



SOURCE: NASA - The state of Rondônia in western Brazil — once home to 208,000 square kilometers of forest (about 51.4 million acres), an area slightly smaller than the state of Kansas — has become one of the most deforested parts of the Amazon. In the past three decades, clearing and degradation of the state's forests have been rapid: 4,200 square kilometers cleared by 1978; 30,000 by 1988; and 53,300 by 1998. By 2003, an estimated 67,764 square kilometers of rainforest—an area larger than the state of West Virginia—had been cleared.

By the start of this satellite time series from the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite, the frontier had reached the remote northwest corner of Rondônia. Intact forest is deep green, while cleared areas are tan (bare ground) or light green (crops, pasture, or occasionally, second-growth forest). Over the span of 12 years, roads and clearings pushed west-northwest from Buritis toward the Jaciparaná River. The deforested area along the road into Nova Mamoré expanded north-northeast all the way to the BR-346 highway. <https://earthobservatory.nasa.gov/Features/WorldOfChange/deforestation.php>



SOURCE: NASA - Cambodia near the border of the Kampong Thom and Kampong Cham provinces - Between 2001 and 2014, the annual forest loss rate in Cambodia increased by 14.4 percent. Put another way, the country lost a total of 1.44 million hectares—or 5,560 square miles—of forest. Other countries with accelerating rates of forest loss include Sierra Leone (12.6 percent), Madagascar (8.3 percent), Uruguay (8.1 percent), and Paraguay (7.7 percent). Top image taken December 31, 2000, bottom image taken October 30, 2015.



SOURCE: NASA - The sparsely populated Gran Chaco plain in South America is home to a dry forest of thorny trees, shrubs, and grasses. The second largest forest in Latin America—behind only the Amazon rainforest—stretches across parts of Paraguay, Argentina, and Bolivia and supports thousands of plant types and hundreds of species of birds, mammals, and reptiles. However, the region also has one of the highest rates of deforestation in the world. Observations by Landsat satellites indicate that roughly 20 percent—142,000 square kilometers (55,000 square miles)—of Gran Chaco’s forest has been converted into farmland or grazing land since 1985. That’s an area roughly the size of New York state. Deforestation has been particularly widespread in Paraguay in recent years. Between 1987 and 2012, the forests in Paraguay lost nearly 44,000 square kilometers (17,000 square miles), mainly because of the expansion of cattle farms in the western part of the country. The Operational Land Imager (OLI) on Landsat 8 captured this natural-color image of pastures in Boquerón on August 14, 2016. The image is centered just east of the Pilcomayo River near Tezén. Unlike the “fishbone” pattern of deforestation in the Amazon, deforestation in the Gran Chaco tends to leave large rectangular clearings that reflect careful surveying by large-scale cattle-ranching operations. <https://earthobservatory.nasa.gov/IOTD/view.php?id=92078&src=corss-iotd>

In March 2001, The Guardian reported that since 1981, China has planted 35,000,000,000 trees increasing forested areas from 12% to 16.55%. Although this sounds amazing, it should also be considered how many of these new trees will actually survive and for how long in addition to how much of a negative impact they could possibly have, as China has used the monoculture method and is not planting indigenous tree species, and many of these trees are eucalyptus trees that have very tough hard to degrade leaves. Even more alarming is that Shanghai has transplanted 70,000 trees from rural areas, including many ancient 100-year-old magnolia species. Even with all of these newly planted trees, China is still suffering from severe soil erosion affecting 1,000,000 hectares, and every year desertification claims an average 950 square miles of more land. (74) In July 2016, as part of a commitment to the Paris Climate Conference, 800,000 volunteers in India planted 50,000,000 trees along railways, roads, and public lands in just 24 hours. (252) Between 2007 and 2016, Plant for the Planet planted 14,200,000,000 trees throughout the world, (688) and since 1977 the Green Belt Movement has planted more than 51,000,000 trees in Kenya. (689) These efforts being done are excellent, but only if the trees being planted are indigenous tree species along with other native florae, otherwise there could be negative impacts to ecosystems, or the trees may have a short lifespan making the well-intentioned efforts futile. How many billions of less trees would be on Earth if these and other initiatives to plant trees were not undertaken? Instead of planting heavy water consuming florae in cities only because it is aesthetically appealing, why don’t governments plant fruit bearing florae, and allow the citizens to harvest this free nutritional food resource? How

much more fresh fruits and vegetables could be grown locally if more edible landscaping were incorporated into living spaces instead of just an aesthetically appealing design? How much wasted open space is there on city rooftops and vacant lots? Would these areas not be put to better use if they were used as community gardens growing free nutritional food? How can consumers be encouraged by the government to grow a 'Victory Garden' during wartime in order to create destruction, but not be equally encouraged to during times of peace in order to save the Earth?



SOURCE: World War I Sow the Seeds of Victory! Poster from the Food Administration - National Archive - <https://www.archives.gov/education/lessons/sow-seeds>

Soils

The soils of Earth are connected and affected by the things that go on in Earth's lithosphere, biosphere, atmosphere, and hydrosphere. Soil is a very delicately balanced resource involving complex processes over long periods of time which continuously change it. Soil takes a very long time to formulate, and many of the soils that are now on earth took 10,000 or more years to form, but currently the soils of Earth are eroding faster than they are forming. Once soils are contaminated or overtaxed it could take this long or even longer, depending on environmental factors, for the soil to not only heal, but to regenerate. In addition to providing the base for *Homo sapiens* agriculture and for almost all terrestrial flora life on the planet, soils also sequester carbon dioxide, so by destroying them this not only releases more carbon dioxide into the atmosphere and then the oceans, it also eliminates a location where future and current carbon dioxide can be stored. Another important thing the soils of Earth do is to help filter and purify water before it goes into rivers, streams, lakes, and other bodies of water.

Everything that goes into the soil can change the soil positively or negatively, be it organic waste or toxic waste. How the soil is used and maintained can greatly affect it, and monoculture along with the continuous application of synthetic fertilizers and pesticides has put severe stress on the soils of Earth. Monoculture along with

synthetic unnatural pesticides and fertilizers have certainly increased crop yields, but what have the ramifications been to the soils of Earth? *Homo sapiens* have a great impact on the soils by their lifestyle habits from overusing fertilizers and pesticides to simply discarding toxic waste onto topsoil, which can leech unnatural chemicals into the soil. By modifying the physicochemical and biological parameters in soil, it has had a negative impact on soil fauna diversity and activity. Heavy metals in particular which contaminate the soils are having a lethal effect on some soil biota. (10) Some of the soils on Earth are now in a constant cycle of pollution as a result of the agricultural practices that *Homo sapiens* are currently engaged in. J. Lag wrote,

“In many countries industrializing of societies has resulted in soil pollution. Dangerous matter has in this way been brought into circulation systems. From the soils the matter is transported to plants and further to animals and man, and by waste products back to the soils again.”

“Intensified agricultural management has led to increases in some special pollution. Along with commercial fertilizers containing phosphorus, small amounts of cadmium are brought to the soils. Nitrogen fertilizers can, under unfavorable circumstances, cause toxic effects in man and animals. Heavy application of certain nutrients may be followed by the exhaustion of others in the soils. Infection matter and parasites can be spread by manure and sewage sludge.” (2)

Although inorganic arsenic is found naturally in soils and rice paddies throughout the world, both diffuse and point source contamination from anthropogenic activities such as sewage treatment works, pesticide and fertilizer use, metal mining and processing, ground water contamination, municipal solid wastes, and other industrial activities have led to elevated inorganic arsenic levels. The floodplains in the United States south central rice growing region which have been heavily contaminated from arsenical pesticide application are a prime example of diffuse arsenic pollution. This inorganic arsenic is passed to *Homo sapiens* when eating foods which have absorbed it from the soils, and after decades of exposure to elevated arsenic levels can subsequently lead to miscarriages, hypertension, bronchitis, skin hypo and hyper pigmentation, and skin, bladder and lung cancers, as arsenic is a chronic carcinogen as well as an acute toxin at higher concentrations. (15) Shouldn't the government require that all foods have arsenic concentration levels included on the nutritional facts label so that consumers can monitor their intake and avoid these health issues? Why isn't the soil where food crops are grown first tested to see how elevated the arsenic levels are, and if they are above natural levels then the area would be abandon for such use?

Many of Earth's soils could now be classified as technosols, they have been devastated from being extremely overused or having been modified extensively from anthropogenic activities, sometimes leaving the soil permanently contaminated and unusable. *Homo sapiens* have exploited, depredated, and overtaxed the soils of Earth severely with the toxic chemicals which are poured into it for agriculture, or by means of waste disposal. Some soils have eroded away unnaturally because of *Homo sapiens* depredations toward the florae or through other modifications to the landscape. Soils have been covered with concrete, buildings, or other things created by *Homo sapiens*. and by doing this they have been separated from the rest of nature and locked away from the natural elements which help to keep them healthy and maintain their functionality. Soils are most often not viewed as a foundation of an ecosystem and even the Earth itself, but rather just another natural resource that can be exploited, and this has led to them being moved or having their composition dramatically altered. Soil conservation and sustainability are very important to not only Earth, but to *Homo sapiens* existence, especially in regard to agriculture. Nearly everything *Homo sapiens* do can affect the soil in one way or another, but unfortunately this natural resource is often taken for granted much of the time, and it is one of the most overlooked areas of conservation. Arbstein, Macías, and Chesworth wrote,

“Soil forms slowly and by comparison tends to erode rapidly, especially where used in agriculture. Estimates have been made that in the USA agricultural soil erodes 12 times faster on average than it forms. In other words ultimately soil is not currently a sustainable resource in the human economy.

Disruption and damage by human activity began with the Paleolithic use of fire to clear large regions starting as much as 50,000 years ago. It has become an increasing threat since the Neolithic invention of agriculture, some 10,000 years ago. This made possible the subsequent invention of civilization and led to further damage to the soil as a result of urbanization and industrialization. Currently, we have damaged to a greater or a lesser degree about 60% of the soils of the world.

Recognition of the vulnerability of soil is at least as old as written history, yet it was not until the first half of the twentieth century that preventative or remedial action at a governmental level was proposed. The European Union has recently

elaborated the Thematic Strategy for Soil Protection. The threats to soil functions identified are erosion, loss of organic matter, contamination, soil sealing, compaction, loss of biodiversity, salinization, and landslides. These are mainly the result of pollution, unsustainable use and climate change. The soil functions identified are (a) food and biomass production (b) storage, filtration and transformation of nutrients and water, (c) habitat and gene pool, (d) platform for most human activities, (e) sources of raw materials, (f) carbon pool, and (g) storage of geological and archeological heritage. Soil protection is now a recognized imperative worldwide, though exigencies of population pressure and of economics over the short term mean that the recognition is more common in an abstract sense than in practice." (7)

In 2015, the United Nations Food and Agriculture Organization issued a report titled, '*Status of the World's Soil Resources*', it was compiled from many scientific studies and other literature written by pedologist from around the world. The report stated,

"Analysis of the database indicates that of the global land mass, artificial surfaces occupy 0.6 percent, croplands 12.6 percent, grasslands 13.0 percent, tree-covered areas 27.7 percent, shrub-covered areas 9.5 percent, herbaceous vegetation 1.3 percent, mangroves 0.1 percent, sparse vegetation 7.7 percent, bare soils 15.2 percent, snow and glaciers 9.7 percent and inland water bodies 2.6 percent."

"For a long period of human activity, until about a thousand years ago, cropland and pasture occupied less than one to two percent each of the global ice-free land area...By 2000, global cropland cover had reached 11 percent and pasture cover 24 percent, according to based on FAO statistics."

"Fungicides have also demonstrated significant negative effects on earthworms. In particular, copper-based fungicides that are resistant to degradation have caused long-term reductions in earthworm populations."

"Approximately 9 percent of crop production increases from 1961-2007 came from increases in the harvest frequency. As more land was double cropped, the global harvested area increased four times faster than total cropland between 2000 and 2011. In addition, with global warming, the areas suited for double or even triple cropping are extending into subtropical and warm temperate regions."

"Greenhouse production has allowed multiple cropping around the world. For fruit and vegetable crops, world greenhouse cultivated area reached a total area of 408,890 ha in 2013, which includes as many as five harvests in a single year. This increasing harvest frequency has reduced soil quality through soil compaction and has increased the risk of pathogen diseases. The intensive use of pesticides and herbicides in greenhouses not only affects soil quality but creates risks to human health. In some greenhouse systems, long term multiple cropping has led to soil acidification, salinization and biological deterioration, especially where large amounts of fertilizer and pesticide/herbicide have been used. In these situations, there is a need to improve management practices, using organic matter, balancing nutrient additions and adopting intermittent fallow."

"Moreover, intensified livestock production requires an increased use of veterinary medicines, sulfa-antibiotics and hormones, all of which carry risks of pollution to soil, water and the livestock products themselves, with risks to biological and human health."

"Mining for coal, gold, uranium, wolfram, tin, platinoids and, in particular, poly-metallic sulphides has created large environmental impacts on soil, water and biota."

"Global trace element emissions and deposition are poorly understood in comparison to our understanding of emissions of sulphur and nitrogen. Emissions of trace elements are associated with combustion of fossil fuel (V, Ni, Hg, Se, Sn), traffic (Pb), insecticides (As), steel manufacture (Mn, Cr), and mining and smelting (As, Cu, Zn, Hg) (Mohammed, Kapri and Goel, 2011). In the United Kingdom, trace element deposition is responsible for 25-85 percent of total trace element inputs to soils. In Europe, the area at risk from Cd, Hg and Pb deposition in 2000 was 0.34 percent, 77 percent and 42 percent respectively, although emissions are declining. In China, 43-85 percent of total As, Cr, Hg, Ni and Pb inputs to agricultural soils originate from atmospheric deposition. In bioavailable form these elements have a toxic effect on soil organisms and plants, influencing the quality and quantity of plant inputs to soils and the rate of decomposition. Significantly, they can also bioaccumulate in the food chain. Activity of trace elements in soils will depend on the specific mobility of the element and this will be influenced by pH, Eh and the concentration of dissolved organic matter with complexing properties. Some trace elements will persist for centuries as they are strongly bound to soil particles. However, they can become bioavailable, as observed in peatlands following drought-induced acidification, drainage and soil erosion."

"Land grabbing - large scale land acquisitions - started initially in response to the 2007-2008 increase in food prices. Since then the phenomenon has intensified. Foreign states and companies and national investors, often with the support of the national government, see land as an attractive asset in order to meet the demands of food supply and energy. Experience in Africa, Eastern Europe, South America and South and Southeast Asia has shown that in an unregulated environment this 'land grab' can lead to the displacement of local farmers. Since fertile land is a limited resource, competition for it may lead to a rise in poverty, violence and social unrest in countries with weak regulatory systems or power imbalances."

Large areas of arable land have been bought or leased in recent years, mainly in developing countries. According to the Land Matrix Global Observatory database, since the year 2000 over 1,000 land deals involving foreign investors have been struck, covering 39 million ha, while another 200 deals cover 16 million ha. The main driver of large land-scale acquisitions continues to be agricultural production, with 40 percent of deals for food crop production and livestock farming, followed by agrofuels as the second most important driver with 190 deals, and forestry projects which have increased by 50 percent. Other acquisitions have been for urban expansion, mining, infrastructure projects and tourism."

"In most developed countries, waste disposal and treatment, industrial and commercial activities, storage, transport spills on land, military operations, and nuclear operations are the key sources of local soil contamination. Management of local soil contamination requires surveys to seek out sites that are likely to be contaminated, site investigations where the actual extent of contamination and its environmental impacts are defined, and implementation of remedial and after-care measures. By contrast, diffuse soil contamination is much harder to manage: in many instances it is not directly apparent but it may cover very large areas and represent a substantial threat. Despite the fact that most developed countries have implemented long-term soil surveys, even these countries still lack a harmonized soil monitoring system, and the real extent of diffuse soil contamination is not known.

According to the most recent data provided by the European Environmental Agency, total potentially contaminated sites in Europe are estimated to be more than 2.5 million, of which 340,000 are thought to be actually contaminated. Approximately one third of the high risk sites have been positively identified as contaminated, and of these only 15 percent have so far been successfully remediated. While trends vary across Europe, it is clear that the remediation of contaminated sites is still a significant undertaking. Waste disposal and industrial activities are the most important sources of soil contamination overall in Europe. The most frequent contaminants are heavy metals and mineral oils.

In the United States, sites contaminated with complex hazardous substances that impact soil, groundwater or surface water are placed on the Superfund National Priorities List (NPL). As of September 29, 2014, there were 1,322 final sites on the NPL. On 1,163 of these sites, measures to address the contamination threat have been completed. An additional 49 sites have been proposed. In addition, the Office of Solid Waste and Emergency Response (OSWER) has cleaned up over 540,000 sites and 9.3 million ha of contaminated land, all of which can be put back into use. In Canada, a total of 12,723 soil contaminated sites has been identified, with 1,699 sites related to surface soil contamination. The key soil contaminants include metals, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs).

The pattern of contamination in Australia is similar to that of other developed countries. Industry, including the petroleum industry, mineral mining, chemical manufacture and processing facilities, and agricultural activities with their use of P fertilizer and pesticides, have caused soil contamination with heavy metals, hydrocarbons, mineral salts, particulates, etc. The total number of contaminated sites is estimated at 80,000 across Australia, with approximately 1,000 actual or potentially contaminated sites in South Australia.

Developing countries are undergoing significant industrialization. If appropriate legal and regulatory frameworks and enforcement capability are not developed, this may lead to soil contamination and pose risks to the environment and human health. In large conurbations, there is also a need for adequate provision of sanitation and drainage so that household wastes are collected and managed safely.

Asian countries experience considerable contamination of agricultural soil and crops by trace elements, and this contamination is becoming a threat to human health and the long-term sustainability of food production in the contaminated areas. In China, it is estimated that nearly 20 million ha of farmland (approximately one fifth of China's total farmland) is contaminated by heavy metals. This may result in a reduction of more than 10 million tons of food supplies each year in China. Atmospheric deposition (mainly from mining, smelting and fly ash) and livestock manures are the main sources of trace elements contaminating arable soil. Among the different trace elements contaminating Chinese agricultural soils, Cd is the biggest concern. Due to its high mobility in the soil (except in poorly drained soil where sulphides are present), it can be easily transferred to the food chain and so poses risks to human health. Arsenic is also naturally present in groundwater in many regions of Southeast Asia. This represents a threat to agriculture, particularly in rice paddy fields where anaerobic conditions prevail. Asia is also the largest contributor to the atmosphere of anthropogenic Hg, which originates from the chemical industry, from Hg mining and from gold mining. All across Asia, areas under rapid economic development are experiencing moderate to severe contamination by heavy metals.

In many parts of Latin America, the results of anthropogenic activities, such as tailings and smelting operations in mining areas, have resulted in arsenic contamination in the soil. These operations enhance the mobilization of arsenic and cause adverse environmental impacts. Also in Latin America, the problem of arsenic contamination in water has been identified in 14 of the continent's 20 countries: Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Peru and Uruguay. The number of exposed people in these countries is estimated to be about 14 million. It is also estimated that during the late 1980s and early 1990s, 3,000 to 4,000 tonnes of Hg were deposited in the Amazon basin as a result of artisanal gold-mining activities, mainly in Brazil, Bolivia, Venezuela and Ecuador. In addition, intensive use of fertilizers and pesticides in many parts of Latin America contributes to soil contamination and causes a range of environmental pollution and human health problems.

In Africa, soil contamination has resulted from mining, spills, and improper handling of waste. The Nigerian federal government reported more than 7,000 spills between 1970 and 2000. In Botswana and Mali, over 10,000 tonnes of pesticides, including DDT, aldrin, dieldrin, chlordane and heptachlor, have leaked from damaged containers and contaminated the soil. Soil contamination in the Near East and North Africa is linked to oil production and heavy mining. In arable land, a common source of soil pollution is the use of contaminated groundwater or wastewater for irrigation."

"Human-induced salinity, mainly caused by irrigation without adequate drainage, affects a much smaller area than natural salinity. According to GLASOD, the extent of human-induced salinity is about 76 million ha (Oldeman, Hakkeling and Sombroek, 1991) of which 52.7 million ha occurs in Asia. In Europe, significant parts of Spain and areas in Italy, Hungary, Greece, Portugal, France and Slovakia are also affected by human-induced salinization."

"Soil water in the southwestern United States has been affected over the past two decades by frequent severe drought events (2000-2002, 2007, 2009), culminating in a three year drought in California (2011-2014) with state-wide impacts on agriculture (Howitt et al., 2014). A shortfall in irrigation water owing to a depleted mountain snowpack was partly offset by increasing groundwater pumping. Recent analysis using Gravity Recover and Climate Experiment (GRACE) satellites has confirmed the resulting massive losses of groundwater since the 1980s from the aquifers underlying California's agriculturally important Central Valley. McNutt (2014) concludes that "... it is this underground drought we can't see that is enduring, worrisome, and in need of attention"

"A summary by den Biggelaar suggests that global mean rates of erosion are between 12 to 15 tonnes ha⁻¹ yr⁻¹...Overall these rates are substantially higher than rates of soil formation, and hence pose a long-term global threat to soils."

"Soils also serve as a source of many medicines. For example, soil microorganisms still account for many of the current clinically relevant antibiotics. It is therefore important to maintain the vast diversity of microorganisms in soil in order preserve the untapped potential for future discoveries important to human health."

Soils in the Sub-Saharan Africa Region

"Land degradation in sub-Saharan Africa (SSA) is believed to be expanding at an alarming rate, accompanied by the lowest agriculture and livestock yields of any region in the world. While cereal production has increased marginally over the past two decades, more than 70 percent of this growth is due to area expansion rather than yield increases. The region also suffers from the world's highest rate of deforestation, with some countries having lost more than 10 percent of their forest cover in the five years up to 2009 and is most likely continuing at the same rate to this day."

"The various threats to soil health and ecosystem services in SSA include: (1) erosion by water or wind; (2) loss of soil organic matter; (3) soil nutrient depletion; (4) loss of soil biodiversity; (5) soil contamination; (6) soil acidification; (7) salinization and sodification; (8) waterlogging; and (9) compaction, crusting and sealing/capping."

Soils in the Asia Region

"With rapid industrialization, urbanization and intensive use of farmland, China is now facing serious soil pollution. About 19.4 percent of farmland has high levels of Cd, Ni and As pollution. Soil contamination has been estimated to cause a reduction of more than 107 tonnes of food supply annually."

"Although the impervious surface area (ISA) covers only 0.43 percent of the global land area at present, ISA is constantly on the increase, as shown by satellite image data and by measures of the constant increase in urban population. More than half of the global population is now concentrated into cities. The Asia region has the largest ISA ratio in the world. China has the largest ISA in Asia followed by India, Indonesia, Japan and Bangladesh. Increase in the ISA causes environmental issues such as the formation of urban heat islands, increases in surface water runoff, and reduction of carbon sequestration due to reduction of the forested area."

"In the least developed countries, manures were considered as precious nutrient resource for crop production. This was also the case in China before the 1980s, when artificial fertilizer was not subsidized. However, from the 1980s on, fertilizer was more widely used than manure in China. The amount of fertilizer applied in China far exceeds rates in other countries in Asia, and even exceeds rates in the United States and EU. In China in 2005 lack of regulation led to more than half of manure being discharged untreated to water bodies."

"Velayutham and Bhattacharyya (2000) reported that the total area subject to soil degradation in India is 45.9 percent. Of this, 37.0 percent is affected by water erosion, followed by wind erosion (4.0 percent), salinization (2.2 percent), loss of nutrients (1.1 percent) and waterlogging (1.6 percent). Land not fit for agriculture (icecaps, salt-flats, arid mountain and rock outcrops) constitutes 5.5 percent of the total area."

"Rapid industrialization in Japan during the 1960s polluted arable soil with heavy metals such as cadmium (Cd), Copper (Cu), and Arsenic (As). There were four main pollution sources: mining activity, factories and incinerators, fertilizer, and precipitation and irrigation water. In 1970, the Japanese government enacted the Agricultural Land Soil Pollution Prevention

Law to regulate heavy metal pollution."

"Rice is the staple crop for the majority of the world's population. In Asia, rice cultivation areas roughly account for 89 percent of the global total. While rice production is thus vital for feeding the world's population, it is also an important source of greenhouse gas emissions, notably methane (CH₄) and nitrous oxide (N₂O). CH₄ is converted from substrate by methanogenic bacteria in strictly anaerobic environments, while N₂O is an intermediate production of nitrification and denitrification. Both of these two gases possess considerably greater infrared absorbing capability than carbon dioxide (CO₂) on a mass basis: 25 times for CH₄ and 298 times for N₂O.

...Yan and colleagues estimated that global CH₄ emission for 2000 was 25.6 Tg CH₄ yr⁻¹...Rice paddies in monsoon Asia countries contributed far and away the largest share of these emissions, estimated at 23.7 Tg CH₄ yr⁻¹. China, with an amount of 7.41 Tg CH₄ yr⁻¹, was estimated to be the largest CH₄ emission country, followed by India, Bangladesh, Indonesia, Vietnam, Myanmar and Thailand. The areas with the greatest emission intensity were the delta regions of large rivers in Bangladesh, Myanmar and Vietnam, the island of Java in Indonesia, central Thailand, southern China and the southwestern portion of the Korean peninsula."

Soils in Europe and the Eurasia Region

"Due to more than 200 years of industrialization, soil contamination is a widespread problem in Europe. The most frequent contaminants are heavy metals and mineral oil. The number of sites where potentially polluting activities have taken place now stands at approximately three million."

"Productive soil continues to be lost to urban sprawl and transport infrastructure. Between 1990 and 2000, the sealed area in the EU-15 increased by 6 percent and at least 275 ha of soil were lost per day in the EU, amounting to 1 000 km² per year. Between 2000 and 2006, the EU average loss increased by 3 percent, but by 14 percent in Ireland and Cyprus, and by 15 percent in Spain. A study by Huber et al. (2008) provides an interesting insight into the development of baselines and thresholds to monitor soil sealing."

Soils in Latin America and the Caribbean Region

"LAC biomes where there is high risk of carbon losses – and also biodiversity losses – are the Amazon and the Atlantic Forest of Brazil, the Pampas of Argentina, the west coast of Colombia and the core of the Sierra Madre del Sur and Sierra Madre Oriental areas in Mexico. Satellite images reveal that more than half a million square kilometers of Amazon rainforest was destroyed between 1984 and 2005 and replaced by agriculture and the introduction of more than 240 million head of cattle."

Soils in the Near East and the North Africa Region

"Soil contamination in the region is most prevalent in countries with high population, high oil production or heavy mining. The increase of population is coupled with huge increases in both solid and liquid wastes that are dumped on land or into water resources causing degradation through pollution. The overuse of chemical fertilizers and the residues of applied pesticides are also sources of pollution of soil and water resources.

In Egypt, the construction of the High Dam reduced soil fertility as the result of sediment load reduction. This in turn forced farmers to rely heavily on inorganic fertilizers which led to high levels of nitrogen and phosphorous in run-off and drainage water, causing an off-site impact on water quality. The discharge of industrial effluents, agricultural drainage water and effluent from navigation activities into the Nile and into main canals and drains contaminates the surface water resource. Industrial effluent also directly affects the water quality of the River Nile system. This comes from sugar factories; cement and fertilizer plants; and plants producing iron and steel, coke and chemicals. Pollutants then accumulate in waterways where, at high concentrations (Biochemical Oxygen Demand and phosphates and total dissolved salts), they cause harmful chemical and biological impacts. Other sources of soil pollution are mainly due to the impacts of heavy mining, agro-chemical residues, and the oil and other industries."

"The impact of soil degradation on biodiversity has received little attention in the countries of the region and there is little information available. Nevertheless, it is estimated that the region is home to one-tenth of the recorded plant species worldwide or about 25 000 species of plants. Of these, 25 percent are endemic to the region, 10 percent are of medicinal value, and many are a source of food. This indicates the importance of the region as a store of genetic resources. The lack of proper conservation practices, overgrazing of herds of ruminants, and deforestation for fuel are causing serious losses of plant cover and of valuable genetic resources, including below-ground biodiversity that is rarely quantified in this region. Proper and sustainable utilization of plant species which yield valuable products could boost incomes and help reduce poverty amongst nomads and local settled populations. However, thousands of plant species and varieties have disappeared, and a further 800 plant species are threatened with extinction and this loss of plant species is likely to result in changes in soil biodiversity.

Iran is renowned for having one of the richest plant reserves in the world. The country has some 12,000 species of plants, the

majority of which are endemic (the Iranian National Action Programme). In the Elmalha area of Sudan, Bakheit (2011) studied the availability and distribution of famine foods and their role in times of famine. The study revealed endemic species that are considered as alternative foods in time of crisis but which are threatened by genetic erosion due to soil degradation. Soil degradation studies in South Sudan indicate the disappearance of palatable grasses such as *Panicum turgidum* and appearance of less palatable grasses such as *Aristida funiculata*. The alien species now covers 40 percent of the pasture area, resulting in disappearance of many wild animals and decrease in biodiversity. The study pointed out that drought, unsustainable use of forest and pasture, and increase in population pressure were the main causes of this environmental degradation."

"Most of the land area of the region falls in the hyper-arid, arid and semi-arid climatic zones. About 87 percent of the region is predominantly desert. Major soil threats are: erosion, salinity/sodicity, pollution, and soil Closs. Main causes of soil degradation are: mismanagement coupled with poor policies; use of inappropriate technology; increased levels of traffic movements and road construction; industrial activities and mining; urban expansion; deforestation, overgrazing and inappropriate cultivation practices; and dumping of hazardous wastes."

"Since the construction of the Aswan High Dam of Egypt in 1970, fertilizers and pesticides have been heavily used in order to substitute for the loss of fertile sediments. FAO (2012) reported that during the period from 1950 to 1990, chemical fertilizer use increased more than fourfold, from 2 143 tonnes in the 1950s up to 11 700 tonnes in 1990. These chemical fertilizers and the residues of applied pesticides have caused the contamination of soil and water resources in the Nile Delta.

In Iran, contamination of soil is increasing from a variety of sources: petroleum hydrocarbons spilled during transportation, leakage from tanks, accidental spillage, pipeline ruptures, or dumping of oil landfill. This contamination threatens soil functions. It may decrease seed germination of grasses by more than 50 percent – although this may not necessarily affect their subsequent performance. It also reduces dry matter accumulation in sunflower and safflower by 50 and 73 percent, respectively. The two Gulf wars in 1990 and 1991 contributed to contamination of this kind through the detonation of oil wells. After the Iraq war, over 300 oil lakes covering an area of 46 km² were formed within Kuwait. The lakes were up to two meters deep, and the oil penetrated the soil to varying depths. To restore"

"Contamination of soil by heavy metals is also an issue. In central Iran, farmers are extensively using sewage sludge as a fertilizer for vegetable production and, in the absence of regulation, heavy metals tend to accumulate in the soil. The so-called 'global dust belt' that extends from the west coast of North Africa, through the Middle East into Central Asia transports mineral dust in the region. This dust may carry contaminants and this has been in fact the main source of soil pollution with heavy metals in the Arabian Peninsula. The dust was found to carry high levels of lead (65 mg kg⁻¹ in Muscat, 742 mg kg⁻¹ in Bahrain and 1,762 mg kg⁻¹ in Riyadh, Saudi Arabia) and nickel (43 to 3033 mg kg⁻¹ in Muscat)."

Soils in the North America Region

"Soils can be compromised via industrial, mining, municipal, residential and agricultural activities. In North America, metals (Pb, Cd, Cr and As), salts (Na and K), pesticides (herbicides and insecticides), pathogens and nutrients (N and P) contaminate soils to varying degrees and with great spatial variation. There are also chemicals of emerging concern, including engineered nanoparticles, pharmaceuticals and personal care products. Perfluorinated compounds are also of concern: they occur in small concentrations but, because of their high reactivity or potential to be endocrine disrupting, they may pose significant risks to human health and the environment...In addition, there are vast areas of low-level soil contamination across the United States which are not monitored by the EPA."

"The population of North America is approximately 5 percent of the world population (340 million) and it has been growing at a rate of 0.9 percent a year, during the last decade. In the United States, the threat of loss of soil due to soil sealing and capping consequent on expansion of settlements and infrastructure is significant and has been steadily increasing since 1982, as documented by the USDA Natural Resources Conservation Service's National Resources Inventory Program (NRI). Between 1982 and 2007, it is estimated that 16.5 million ha of land were developed for urban or transportation uses. By 2007, the United States had an estimated total of 45 million ha developed into urban uses. Of the newly developed land, 41 percent was previously forest land, 27 percent was cropland, 17 percent was pasture, and 13 percent was rangeland. In regard to land categories, 35 percent of the land in the United States that was developed into urban uses during the period of 1982 to 2007 was classified as prime farmland. Prime farmland is land that has the best combination of soil physical and chemical characteristics for producing food, feed, forage, fibre and oilseed crops and has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed at high levels. Prime farmland is also the most economically viable land to develop as it typically has the lowest degree of limitations for conversion into urban development. This increases the pressure on land with the best soil. Using the 2007 NRI information as a base, the trajectory of prime farmland (cropland portion) conversion and the loss of potential food production is immense over the next 25 years. With this rate of loss, the United States will lose the equivalent of 10M metric tonnes of corn in 2022 due to sealing/capping activities.

The drivers for soil sealing in Canada are very similar to those in the United States. The growth of metropolitan centers has been particularly rapid since the 1990s in areas surrounding Toronto, Kitchener-Waterloo, Ottawa, and Vancouver and, most recently, in areas surrounding urban centers in Saskatchewan and Alberta. Between 1996 and 2006, urban land increased by

more than 10 percent nationally. It now totals nearly 0.13 million ha, or 0.25 percent of the total land area in Canada. Given land-cover data extrapolated from a suburban United States city (specifically, San Jose with 59 percent impervious surface by area and the fact that suburbs now make up the majority of Canada's metropolitan population, it is estimated that more than 1 300 km² of soil was capped through urban expansion between the 1990s and 2000s. It is noteworthy that this expansion has occurred largely on highly productive soils. Major interregional highway construction and expansion (e.g. highway twinning) have also been ongoing, particularly in Ontario, British Columbia, and Alberta. Total road length (in two lane equivalents) in Canada increased by more than 17 percent between 1990 and 2009 (Transport Canada, 2012; United States Department of, and, assuming a conservative average road width of 10 m, roads now cover more than 10 000 km². However, it is important to note that a portion of this impervious area is also included in the estimated urban area described above"

"Many regions of North America have experienced and continue to experience nutrient applications in excess of plant requirements. These surpluses lead to elevated levels of N and P in soils, which cause a range of environmental problems and are a source of considerable societal concern throughout North America. The greatest issue with nutrient imbalance in North America is the impact of elevated N and P levels in soil from past and present agricultural activities on water quality. The linkage of elevated soil N and P levels to water quality problems ranges from algal blooms due to eutrophication in Lake Winnipeg in Manitoba, at the northern edge of the agricultural zone, to the seasonal hypoxia in the shallow coastal waters of the Louisiana shelf in the northern Gulf of Mexico, at the southern end of the agricultural zone."

"Attributes (SPARROW) model by United States Geological Survey (2014) researchers found that the majority of both total N and total P in these waterways is from agricultural land. Specifically, 52 percent of total N reaching the Gulf of Mexico was from maize-and soybean-producing land with a further 14 percent from all other crops in the basin. Some 37 percent of total P was from rangeland/pasture land with a further 25 percent from maize- and soybean-producing land. Considerable regional variations occur. For example, in the western sections of the Missouri River basin where cattle grazing is the dominant land use, as much as 34 percent of total N was from manure whereas in the Mississippi River basin as a whole, only 5 percent of total N was from rangeland and pasture land."

Soils in the Southwest Pacific Region

"The Southern Hemisphere does not have the same history of large scale industrialization as the Northern Hemisphere. However, soil contamination is a significant problem mainly in relation to impurities in phosphate fertilizers, agricultural chemicals, mining, waste disposal, former industrial sites and nuclear testing. Reviews of the history of soil contamination in the region are provided by Naidu et al. (1996) and more specifically for Australia, New Zealand, Papua New Guinea and South Pacific Islands. Throughout the region there are tens of thousands of contaminated sites but the scale of the remediation task is not clear. Australia and New Zealand have a long and effective history of working together to coordinate the management and remediation of soil contamination but the waste management problem facing small islands in the Pacific is a serious and escalating problem."

"In Papua New Guinea riverine disposal of processing residues, waste rock and overburden into rivers (e.g. Ok Tedi and Porgera) is having a large and long-term environmental impact on soils. Since 1984, the 1,000 km long Fly River system has received about 66 million tonnes yr⁻¹ of mining waste from the Ok Tedi coppergold-porphyry mine and this has caused widespread contamination and altered hydrological regimes. Elevated levels of copper, zinc, cadmium and lead occur in the sediments that have been deposited in the alluvial systems of the Fly River but the longer-term impacts on ecosystems and human health are not clear." (473)

To correct these issues and maintain soil sustainability, *Homo sapiens* will need to practice better soil conservation techniques and use a more natural organic fertilizing method by simply returning organic matter to soil, in addition to utilizing more environmentally friendly agricultural management practices like low-till agriculture and diversified cropping systems. Focusing more on organic fertilizers and biopesticides, (e.g. biochemicals, invertebrates, microbials, or other natural processes to aid) along with simply allowing the natural processes to work, could completely replace the toxic chemicals and other environmentally harmful practices that are currently being used in agriculture. If soil contamination ceases, and the soil faunae are allowed to thrive, they will naturally help to repair the damaged soils. Valerie M. Behan-Pelletier and Stuart B. Hill wrote,

"Managing soil to optimize productivity in agriculture and forestry without the use of chemicals, to minimize environmental degradation, or to restore degraded soils, will require the use and manipulation of soil animals as natural biocontrol agents and as catalysts in decomposition and nutrient cycling. The core of this management concept is letting "the soil work for us". The working principles are: keeping the soil covered with plants or mulches, avoiding the application of toxic substances, and thus providing ideal working conditions for soil fauna and microorganisms." (10)

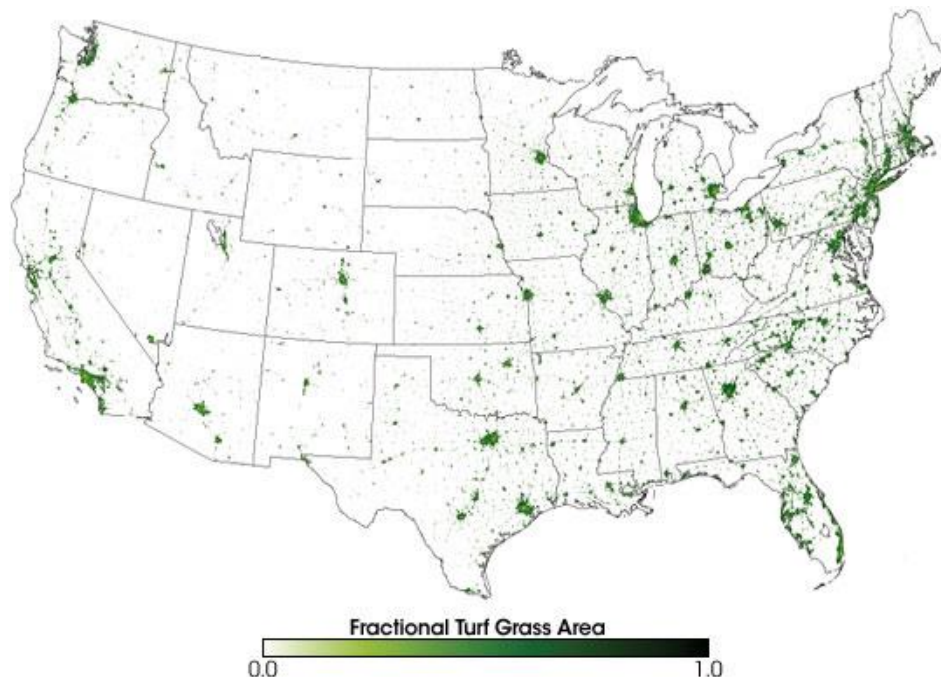
And Yucheng Feng writes that,

"Many toxic chemicals have found their way into soil as a result of industrial and agricultural activities. Biodegradation of

organic pollutants can be considered a special case of organic matter decomposition. Microorganisms are able to use many organic pollutants as sources of carbon and energy. Microorganisms, especially bacteria, are constantly evolving and adapting their enzyme systems to new substrates and changing environments. This provides a great potential for the use of microorganisms to degrade recalcitrant chemicals and to clean up the contaminated soils.” (8)

Aesthetically Pleasing Lawns, Gardens, Parks, and Cities

Lawns and gardens have been referred to as *‘nature perfected’*, but how is it possible to perfect the already perfect? In an attempt to maintain these pseudo perfected lawns and gardens, many Americans, Europeans, Asians, and others throughout the world apply heavy amounts of fertilizers and pesticides while also utilizing vast amounts of water. At one time, all lawn equipment was powered by manual labor, but most lawn equipment today uses gasoline, and there are an estimated 120,978,220 GLGEs (gas-powered lawn and garden equipment) in the United States alone. (e.g. mowers, leaf blowers, vacuums, trimmers, edgers, cutters, chain saws, chippers, rotary tillers, stump grinders, shredders, snowblowers, tractors, turf equipment, etc.) (312) This lawn equipment has little to no emission controls implemented at the manufacturing level, as there are virtually no government regulations requiring them to do so, even though it is a significant source of emissions containing volatile organic compounds (VOCs) and other pollutants. Will all future GLGEs eventually be phased out and replaced with ELGEs (electrically-powered lawn and garden equipment) or perhaps SLGEs (solar-powered lawn and garden equipment)?



SOURCE: NASA - According to Milesi's estimates, more surface area in the United States is devoted to lawns than to individual irrigated crops such as corn or wheat. This map uses shades of green to indicate the fraction of the U.S. land surface area covered by lawns, including residential, industrial, and recreational. (Map courtesy Cristina Milesi.)

<https://earthobservatory.nasa.gov/Features/Lawn/lawn2.php>

Much of the florae planted in cities, parks, and in personal gardens throughout the world is non-native and planted purely for aesthetics, and it very often consumes far more amounts of water than native florae do, especially in desert ecosystems. The palm tree is a prime example of this in cities throughout the world, in Los Angeles alone it was estimated that 75,000 palms lined the city streets in the 1990s. How many millions of high water consuming palm trees and other non-native florae have been imported and grown in cities depleting precious water resources? Why attempt to fight nature and turn a desert into a wet ecosystem when it will just naturally dry up and turn back into the natural desert it has been for thousands of years?

Intentional Industrial Related Environmental Depredations

Each day, some corporations continuously pollute the Earth all in the name of profits, and it usually goes unnoticed to most in the world. It is often masked as *'just a part of doing business'* or a *'necessary cost'* to ensure the economy continues to grow, but this is untrue, business can be done without destroying the environment, and the economy can adapt, and business can actually be a positive thing if done correctly, but only when the environment is put before profits. Otherwise a corporation will take the easiest path to profits with the burden continuing to fall onto the Earth. As has been seen time and time again, too few corporations will very seldom follow the path of environmental stewardship willingly, and therefore it is the government's responsibility to ensure they do, but this cannot be done if corporations can so easily influence the regulatory system of government. If corporations are unable to hide their intentional depredations in the future through more transparency, less corruption of government, better regulations, and stricter enforcement of these regulations, then perhaps there will be less hidden destruction of the Earth. In 2017, at least 11 blue colored stray dogs were spotted roaming the streets in Mumbai after a manufacturing company dumped untreated industrial waste and dyes into a river, and the company was shut down after the blue dogs gained international media attention. (514) And this is yet another prime example of how once again when the truth is unveiled and there is public outrage the government must take action. But it should never have to come to this point, and if the government regulatory system functions properly and there is strict enforcement it never will.

Some Major Industrial Related Depredations and other Corporate Scandals	
Minamata Bay Dumpings 1932-1968	From 1932 to 1968, the chemical company Chisso discharged effluent containing methyl mercury from their plant in Minamata. Methyl mercury contaminated the Minamata Bay and accumulated in fish, which were then consumed by the local population. In 1968 the discharge of poisonous effluent was ceased due to discontinuation of acetaldehyde production at the Chisso factory. However, the sea sediment as well as fish remained contaminated and so measures were taken to counteract the effects. In 1975, the bay was fenced by fishing nets. A sludge dredging project was initiated in 1977 and continued till 1990. During the project, 784,000m ³ of sludge was dredged and 582,000 m ² of land was reclaimed. On July 29, 1997, a Minamata Bay Safety Declaration was issued, nets had been removed and the environment was pronounced safe. By 2007, a total of 2,668 people were certified as Minamata disease patients, 639 of whom are alive today.
The Dust Bowl 1934-1940	<p>The Dust Bowl, also known as the Dirty Thirties, was a period of severe dust storms that greatly damaged the ecology and agriculture of the American and Canadian prairies during the 1930s; severe drought and a failure to apply dryland farming methods to prevent wind erosion (the Aeolian processes) caused the phenomenon. The drought came in three waves, 1934, 1936, and 1939–1940, but some regions of the high plains experienced drought conditions for as many as eight years. With insufficient understanding of the ecology of the plains, farmers had conducted extensive deep plowing of the virgin topsoil of the Great Plains during the previous decade; this had displaced the native, deep-rooted grasses that normally trapped soil and moisture even during periods of drought and high winds. The rapid mechanization of farm equipment, especially small gasoline tractors, and widespread use of the combine harvester contributed to farmers' decisions to convert arid grassland (much of which received no more than 10 inches (250 mm) of precipitation per year) to cultivated cropland.</p> <p>During the drought of the 1930s, the unanchored soil turned to dust, which the prevailing winds blew away in huge clouds that sometimes blackened the sky. These choking billows of dust – named "black blizzards" or "black rollers" – traveled cross country, reaching as far as the East Coast and striking such cities as New York City and Washington, D.C. On the Plains, they often reduced visibility to 1 meter (3.3 ft) or less. Associated Press reporter Robert E. Geiger happened to be in Boise City, Oklahoma, to witness the "Black Sunday" black blizzards of April 14, 1935; Edward Stanley, Kansas City news editor of the Associated Press coined the term "Dust Bowl" while rewriting Geiger's news story. While the term "the Dust Bowl" was originally a reference to the geographical area affected by the dust, today it is usually used to refer to the event, as in "It was during the Dust Bowl". The drought and erosion of the Dust Bowl affected 100,000,000 acres (400,000 km²) that centered on the panhandles of Texas and Oklahoma and touched adjacent sections of New Mexico, Colorado, and Kansas. The Dust Bowl forced tens of thousands of families to abandon their farms. Many of these families, who were often known as "Okies" because so many of them came from Oklahoma, migrated to California and other states to find that the Great Depression had rendered economic conditions there little better than those they had left. In many regions, more than 75% of the topsoil was blown away by the end of the 1930s. Land degradation varied widely. On November 11, 1933, a very strong dust storm stripped topsoil from desiccated South Dakota farmlands in just one of a series of severe dust storms that year. Beginning on May 9, 1934, a strong, two-day dust storm removed massive amounts of Great Plains topsoil in one of the worst such storms of the Dust Bowl. The dust clouds blew all the way to Chicago, where they deposited 12 million pounds of dust. Two days later, the same storm reached cities to the east, such as</p>

	<p>Cleveland, Buffalo, Boston, New York City, and Washington, D.C. That winter (1934–1935), red snow fell on New England.</p>
<p>The General Motors Electric Streetcar Conspiracy 1938-1950</p>	<p>The General Motors electric streetcar conspiracy refers to convictions of General Motors (GM) and other companies for monopolizing the sale of buses and supplies to National City Lines (NCL) and its subsidiaries, and to allegations that this was part of a deliberate plot to purchase and dismantle electric streetcar systems in many cities in the United States as an attempt to monopolize surface transportation. Between 1938 and 1950, National City Lines and its subsidiaries, American City Lines and Pacific City Lines—with investment from GM, Firestone Tire, Standard Oil of California through a subsidiary, Federal Engineering, Phillips Petroleum, and Mack Trucks—gained control of additional transit systems in about 25 cities. Systems included St. Louis, Baltimore, Los Angeles, and Oakland. NCL often converted streetcars to bus operations in that period, although electric traction was preserved or expanded in some locations. Other systems, such as San Diego's, were converted by outgrowths of the City Lines. Most companies involved were convicted in 1949 of conspiracy to monopolize interstate commerce in the sale of buses, fuel, and supplies to NCL subsidiaries, but were acquitted of conspiring to monopolize the transit industry.</p> <p>In 1946, Edwin Jenyss Quinby, an activated reserve commander, founder of the Electric Railroaders' Association in 1934 (which lobbied on behalf of rail users and services), former employee of North Jersey Rapid Transit (which operated in New York) published a 24-page 'expose' on the ownership of National City Lines addressed to "The Mayors; The City Manager; The City Transit Engineer; The members of The Committee on Mass-Transportation and The Tax-Payers and The Riding Citizens of Your Community". It began, "This is an urgent warning to each and every one of you that there is a careful, deliberately planned campaign to swindle you out of your most important and valuable public utilities—your Electric Railway System". His activism may have led Federal authorities to prosecute GM and the other companies. He also questioned who was behind the creation of the Public Utility Holding Company Act of 1935, which had caused such difficulty for streetcar operations.</p> <p>On April 9, 1947, nine corporations and seven individuals (officers and directors of certain of the corporate defendants) were indicted in the Federal District Court of Southern California on counts of "conspiring to acquire control of a number of transit companies, forming a transportation monopoly" and "conspiring to monopolize sales of buses and supplies to companies owned by National City Lines" which had been made illegal by the 1890 Sherman Antitrust Act. In 1948, the venue was changed from the Federal District Court of Southern California to the Federal District Court in Northern Illinois following an appeal to the United States Supreme Court (in <i>United States v. National City Lines Inc.</i>) which felt that there was evidence of conspiracy to monopolize the supply of buses and supplies.</p> <p>In 1949, Firestone Tire, Standard Oil of California, Phillips Petroleum, GM and Mack Trucks were convicted of conspiring to monopolize the sale of buses and related products to local transit companies controlled by NCL; they were acquitted of conspiring to monopolize the ownership of these companies. The verdicts were upheld on appeal in 1951. GM was fined \$5,000 and GM treasurer H.C. Grossman was fined \$1. The trial judge said "I am very frank to admit to counsel that after a very exhaustive review of the entire transcript in this case, and of the exhibits that were offered and received in evidence, that I might not have come to the same conclusion as the jury came to were I trying this case without a jury," explicitly noting that he might not himself have convicted in a bench trial.</p>
<p>GE Hudson River Dumping 1947-1977</p>	<p>Pollution of the Hudson River is largely due to dumping of PCBs by General Electric from 1947 to 1977. GE dumped an estimated 1.3 million pounds of PCBs into the Hudson River during these years. This pollution caused a range of harmful effects to wildlife and people who eat fish from the river or drink the water.</p>
<p>Love Canal 1947-1999</p>	<p>Love Canal is a neighborhood within Niagara Falls, New York. The neighborhood is infamously known as the host of a 70-acre landfill that served as the epicenter of a massive environmental pollution disaster that affected the health of hundreds of residents, culminating in an extensive Superfund cleanup operation. Originally intended as a model planned community, Love Canal served as a residential place before being purchased by Hooker Chemical Company (now Occidental Chemical Corporation). After its sale to the local school district, Love Canal attracted national attention for the public health problem originated from the massive dumping of toxic waste on the grounds. This event displaced numerous families, leaving them with long-standing health issues and symptoms of high white blood cell counts and leukemia. Consequently, the federal government passed the Superfund law. The resulting cleanup operation under the Superfund law demolished the neighborhood, wrapping up in 2004. New York State Health Department Commissioner David Axelrod calls the Love Canal incident a "national symbol of a failure to exercise a sense of concern for future generations". The Love Canal incident was especially significant as a situation where the inhabitants "overflowed into the wastes instead of the other way around" During its 10-year lifespan,</p>

	<p>the 16-acre landfill served as the dumping site of 21,800 tons of chemicals, mostly composed of products such as "caustics, alkalines, fatty acid and chlorinated hydrocarbons resulting from the manufacturing of dyes, perfumes, and solvents for rubber and synthetic resins". On August 7, 1978, United States President Jimmy Carter announced a federal health emergency, called for the allocation of federal funds, and ordered the Federal Disaster Assistance Agency to assist the City of Niagara Falls to remedy the Love Canal site.[48] This was the first time in American history that emergency funds were used for a situation other than a natural disaster. The entire process took 21 years and \$400 million.</p>
Westinghouse Electric Dumping 1950s-1977	<p>From the late 1950s through 1977, Westinghouse Electric used PCBs in the manufacture of capacitors in its Bloomington, Indiana plant. Reject capacitors were hauled and dumped in area salvage yards and landfills, including Bennett's Dump, Neal's Landfill and Lemon Lane Landfill. Workers also dumped PCB oil down factory drains, which contaminated the city sewage treatment plant. The City of Bloomington gave away the sludge to area farmers and gardeners, creating anywhere from 200 to 2000 sites, which remain unaddressed. Over 2 million pounds of PCBs were estimated to have been dumped in Monroe and Owen counties. Although federal and state authorities have been working on the sites' environmental remediation, many areas remain contaminated.</p>
Outboard Marine Corporation Dumping 1954	<p>In 1976 environmentalists found PCBs in the sludge at Waukegan Harbor, the southwest end of Lake Michigan. They were able to trace the source of the PCBs back to the Outboard Marine Corporation that was producing boat motors next to the harbor. By 1982, the Outboard Marine Corporation was court-ordered to release quantitative data referring to their PCB waste released. The data stated that from 1954 they released 100,000 tons of PCB into the environment, and that the sludge contained PCBs in concentrations as high as 50%.</p>
Sangamo Weston Dumping 1955-1977	<p>From 1955 until 1977, the Sangamo Weston plant in Pickens, SC, used PCBs to manufacture capacitors, and dumped 400,000 pounds of PCB contaminated wastewater into the Twelve Mile Creek. In 1990, the EPA declared the 228 acres (0.92 km²) site of the capacitor plant, its landfills and the polluted watershed, which stretches nearly 1,000 acres (4.0 km²) downstream to Lake Hartwell as a Superfund site.</p>
Niger Delta Oil Spills 1958 - ongoing	<p>The key environmental issues in the Niger Delta of Nigeria relate to its petroleum industry. Reports on the extent of the oil spills vary. The Department of Petroleum Resources estimated 1.89 million barrels of petroleum were spilled into the Niger Delta between 1976 and 1996 out of a total of 2.4 million barrels spilled in 4,835 incidents. (approximately 220 thousand cubic metres). A UNDP report states that there have been a total of 6,817 oil spills between 1976 and 2001, which account for a loss of three million barrels of oil, of which more than 70% was not recovered. 69% of these spills occurred off-shore, a quarter was in swamps and 6% spilled on land.</p> <p>The Nigerian National Petroleum Corporation places the quantity of petroleum jettisoned into the environment yearly at 2,300 cubic metres with an average of 300 individual spills annually. However, because this amount does not take into account "minor" spills, the World Bank argues that the true quantity of petroleum spilled into the environment could be as much as ten times the officially claimed amount. The largest individual spills include the blowout of a Texaco offshore station which in 1980 dumped an estimated 400,000 barrels (64,000 m³) of crude oil into the Gulf of Guinea and Royal Dutch Shell's Forcados Terminal tank failure which produced a spillage estimated at 580,000 barrels (92,000 m³). In 2010 Baird reported that between 9 million and 13 million barrels have been spilled in the Niger Delta since 1958. One source even calculates that the total amount of petroleum in barrels spilled between 1960 and 1997 is upwards of 100 million barrels (16,000,000 m³).</p> <p>Oil spills are a common event in Nigeria. Half of all spills occur due to pipeline and tanker accidents (50%), other causes include sabotage (28%) and oil production operations (21%), with 1% of the spills being accounted for by inadequate or non-functional production equipment. Corrosion of pipelines and tankers is the rupturing or leaking of old production infrastructures that often do not receive inspection and maintenance. A reason that corrosion accounts for such a high percentage of all spills is that as a result of the small size of the oilfields in the Niger Delta, there is an extensive network of pipelines between the fields, as well as numerous small networks of flowlines—the narrow diameter pipes that carry oil from wellheads to flowstations—allowing many opportunities for leaks. In onshore areas most pipelines and flowlines are laid above ground. Pipelines, which have an estimate life span of about fifteen years, are old and susceptible to corrosion. Many of the pipelines are as old as twenty to twenty-five years.</p>
Centralia Mine Fire 1962	<p>The Centralia mine fire is a coal seam fire that has been burning underneath the borough of Centralia, Pennsylvania, United States since at least May 27, 1962. The fire is suspected to be from deliberate burning of trash in a former strip mine, igniting a coal seam. The fire burns in underground coal mines at depths of up to 300 feet over an eight-mile stretch of 3,700 acres. At its current rate, it could burn for over 250 more years. The blaze has resulted in most of the town being abandoned. The population dwindled from 2,761 in 1890 to only 7 in 2013, and most of the buildings have been leveled.</p>

Yushō Disease 1968	<p>Yushō disease was a mass poisoning by polychlorinated biphenyls (PCBs) which occurred in northern Kyūshū, Japan in 1968. In January 1968, rice bran oil produced by Kanemi Company in Kyushu was contaminated with PCBs and polychlorinated dibenzofurans (PCDFs) during production. For deodorization, the oil was heated using PCB as the heating medium, circulating through pipes. Due to holes in the pipes the PCB leaked into the rice bran oil. The contaminated rice bran oil was then sold to poultry farmers for use as a feed supplement and to consumers for use in cooking. In February to March 1968, farmers started reporting that their poultry were dying due to apparent difficulty in breathing; altogether 400,000 birds died. About 14,000 people who had consumed the contaminated rice oil were affected in Japan. Common symptoms included dermal and ocular lesions, irregular menstrual cycles and a lowered immune response. Other symptoms included fatigue, headache, cough, and unusual skin sores. Additionally, in children, there were reports of poor cognitive development.</p>
Buffalo Creek Flood 1972	<p>The Buffalo Creek flood was a disaster that occurred on February 26, 1972, when the Pittston Coal Company's coal slurry impoundment dam #3, located on a hillside in Logan County, West Virginia, burst, four days after having been declared 'satisfactory' by a federal mine inspector.</p> <p>The resulting flood unleashed approximately 132,000,000 US gallons (500,000 m3) of black waste water, cresting over 30 ft high, upon the residents of 16 coal towns along Buffalo Creek Hollow. Out of a population of 5,000 people, 125 were killed, 1,121 were injured, and over 4,000 were left homeless. 507 houses were destroyed, in addition to forty-four mobile homes and 30 businesses. The disaster destroyed or damaged homes in Saunders, Pardee, Lorado, Craneco, Lundale, Stowe, Crites, Latrobe, Robinette, Amherstdale, Becco, Fanco, Braeholm, Accoville, Crown and Kistler. In its legal filings, Pittston Coal referred to the accident as "an Act of God."</p>
Seveso Disaster 1976	<p>The Seveso disaster was an industrial accident that occurred around 12:37 pm on July 10, 1976, in a small chemical manufacturing plant approximately 20 kilometres (12 mi) north of Milan in the Lombardy region of Italy. It resulted in the highest known exposure to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in residential populations, which gave rise to numerous scientific studies and standardized industrial safety regulations. The EU industrial safety regulations are known as the Seveso II Directive. The reactor relief valve eventually opened, causing the aerial release of 6 tonnes of chemicals, which settled over 18 km2 (6.9 sq mi) of the surrounding area. Among the substances released was 1 kg of TCDD. At the nominal reaction temperature, TCDD is normally seen only in trace amounts of less than 1 ppm (parts per million). However, in the higher-temperature conditions associated with the runaway reaction, TCDD production apparently reached 100 ppm or more.</p> <p>The affected area was split into zones A, B and R in decreasing order of surface soil concentrations of TCDD. The local population was advised not to touch or eat locally grown fruits or vegetables. Within days a total of 3,300 animals, mostly poultry and rabbits, were found dead. Emergency slaughtering commenced to prevent TCDD from entering the food chain, and by 1978 over 80,000 animals had been slaughtered. 15 children were quickly hospitalised with skin inflammation. By the end of August, Zone A had been completely evacuated and fenced, 1,600 people of all ages had been examined and 447 were found to suffer from skin lesions or chloracne.</p>
Midnight PCB Dumpings of 1978	<p>The purpose of the Warren County PCB landfill, as the public knew it, was to bury 60,000 tons of PCB-contaminated soil that had been contaminated with toxic PCBs between June and August, 1978, by Robert J. Burns, a business associate with Robert "Buck" Ward of the Ward PCB Transformer Company of Raleigh, North Carolina. Burns and his sons deliberately dripped 31,000 gallons of PCB-contaminated oil along some 240 miles of highway shoulders in 14 counties. Burns of Jamestown, New York, was supposed to take the oil to a facility to be recycled. Allegedly, the rationale for Burns' crime was that he wanted to save money by circumventing new EPA regulations that would make waste disposal more transparent and costly. But he could have easily, discreetly, and illegally disposed of the PCB-contaminated oil in a matter of hours. Burns and Ward were sent to prison for a short time for their involvement in the crime. The Ward Transformer site would later go onto the EPA Superfund cleanup list and be the primary polluter of Lake Crabtree and the Neuse River basin in the vicinity of Raleigh, North Carolina. Contaminants from the Ward site have been detoxified, but the area around the site and surrounding creeks, lakes, and rivers have been permanently polluted.</p>
Chemko Dumpings 1980s	<p>The chemical plant Chemko in Strážske (east Slovakia) was an important producer of polychlorinated biphenyls for the former communist block (Comecon) until 1984. Chemko contaminated a large part of east Slovakia, especially the sediments of the Laborec river and reservoir Zemplínska šírava.</p>
Times Beach Disaster 1983	<p>Times Beach is a ghost town, now a state park, in St. Louis County, Missouri, United States, 17 miles (27 km) southwest of St. Louis and 2 miles (3 km) east of Eureka. Once home to more than two thousand people, the town was completely evacuated early in 1983 due to a dioxin contamination that made national headlines in other countries. The news press in America covered it up to avoid mass fear. It was the largest civilian exposure to dioxin in the country's history.</p>

	<p>Although incineration was the best method to destroy dioxins at the time, it was also very expensive. Looking for less costly alternatives, NEPACCO contracted the services of the Independent Petrochemical Corporation (IPC). However, IPC, a chemical supplier company, knew very little about waste disposal, and subcontracted the NEPACCO job to Russell Martin Bliss, the owner of a small and local waste oil business. Charging NEPACCO \$3000 per load, IPC paid Bliss \$125 per load. Between February and October 1971, Bliss collected six truckloads (nearly 18,500 gallons) of chemical waste heavily contaminated with dioxin. Bliss took most of the still bottoms to his storage facility near Frontenac, Missouri, where the contaminated NEPACCO waste was unloaded and mixed into tanks containing used crankcase oils. Subsequently, some of the contaminated oil was sold to MT Richards, a fuel company in Illinois, and to the Midwest Oil Refining Company in Overland, Missouri.</p> <p>In addition to his waste oil business, Bliss owned a horse arena and farm, where he sprayed waste oils to control the problem of dust. One application kept the dust down for several months. Those who visited Bliss' property were impressed by how well the technique worked. It was not long before people began to hire him for his dust-suppressant services.</p> <p>On May 26, 1971, the owners of Shenandoah Stable, located near Moscow Mills, Missouri, Judy Piatt and Frank Hampel, paid Bliss \$150 to spray the floor of their indoor arena. The waste oil sprayed, which totaled a volume of 2,000 gallons, was uncharacteristically thick, and left a pungent, burning odor. Within a few days of the spraying, birds began to drop dead from the rafters of the barns, and horses began to develop sores and lose their hair. Piatt and Hampel blamed these occurrences on Bliss, who denied responsibility, claiming that the material he sprayed was nothing more than old motor oil. Acting on their suspicions, Piatt and Hampel removed the top six inches of soil from the entire arena and disposed of it in a landfill. Despite the removal of another twelve inches of soil a few months later, the horses that came to the arena still became ill. After several months, sixty-two horses died, or became so emaciated that they had to be euthanized. Hampel, Piatt, and Piatt's two young daughters also became ill, succumbing to headaches, nosebleeds, abdominal pain, and diarrhea.</p> <p>A month after the spraying at Shenandoah, Bliss was hired to spray the arena at Timberline Stables, near Jefferson City, Missouri. Twelve horses died, and children exposed to the arena were diagnosed with chloracne, a skin condition associated with dioxin poisoning. Suspecting that Bliss' oil was the source of their problems, the owners of Timberline removed the top layer of soil from their property. A third arena, at Bubbling Springs Ranch, near St. Louis, was also sprayed around the same time as Timberline, and faced similar problems. Like at Shenandoah and Timberline, the owners decided to remove the top layer of soil from their arena. Vernon Stout, a road-grading contractor, completed the removal in March 1973. Instead of bringing the soil to a landfill, however, Stout unloaded the soil onto one of his properties and at the nearby home of Harold Minker. In 1972, Times Beach hired Bliss to oil its twenty-three miles of dirt roads. For \$2,400, Bliss sprayed approximately 160,000 gallons of waste oil in Times Beach over a period of four years.</p> <p>On December 23, 1982, the CDC publicly recommended that Times Beach not be reinhabited. Officials were uncertain about the health effects of extensive dioxin exposure, and even more uncertain of how to rid an entire town of dioxin. Because the town was situated on a flood plain, officials were further concerned that subsequent flooding would spread the contamination beyond control.</p>
Bhopal disaster 1984	<p>The Bhopal disaster, also referred to as the Bhopal gas tragedy, was a gas leak incident in India, considered the world's worst industrial disaster. It occurred on the night of 2–3 December 1984 at the Union Carbide India Limited (UCIL) pesticide plant in Bhopal, Madhya Pradesh. Over 500,000 people were exposed to methyl isocyanate (MIC) gas and other chemicals. The highly toxic substance made its way into and around the shanty towns located near the plant.</p> <p>Estimates vary on the death toll. The official immediate death toll was 2,259. The government of Madhya Pradesh confirmed a total of 3,787 deaths related to the gas release. A government affidavit in 2006 stated that the leak caused 558,125 injuries, including 38,478 temporary partial injuries and approximately 3,900 severely and permanently disabling injuries. Others estimate that 8,000 died within two weeks, and another 8,000 or more have since died from gas-related diseases. The cause of the disaster remains under debate. The Indian government and local activists argue that slack management and deferred maintenance created a situation where routine pipe maintenance caused a backflow of water into a MIC tank, triggering the disaster. Union Carbide Corporation (UCC) contends water entered the tank through an act of sabotage.</p>
Ok Tedi Disaster 1984-2013	<p>The Ok Tedi environmental disaster caused severe harm to the environment along 1,000 kilometres (620 mi) of the Ok Tedi River and the Fly River in the Western Province of Papua New Guinea between about 1984 and 2013. The lives of 50,000 people have been disrupted. One of the worst</p>

	<p>environmental disasters caused by humans, it is a consequence of the discharge of about 2,000,000,000 tons of untreated mining waste into the Ok Tedi from the Ok Tedi Mine, an open pit mine in the Western Province of Papua New Guinea.</p> <p>In 1999, BHP reported that 90 million tons of mine waste was annually discharged into the river for more than ten years and destroyed downstream villages, agriculture and fisheries. Mine wastes were deposited along 1,000 kilometres (620 mi) of the Ok Tedi and the Fly River below its confluence with the Ok Tedi, and over an area of 100 square kilometres (39 sq mi). BHP's CEO, Paul Anderson, said that the Ok Tedi Mine was "not compatible with our environmental values and the company should never have become involved." As of 2006, mine operators continued to discharge 80 million tons of tailings, overburden and mine-induced erosion into the river system each year. About 1,588 square kilometres (613 sq mi) of forest has died or is under stress. Following heavy rainfall, mine tailings are swept into the surrounding rain forest, swamps and creeks, and have left behind 30 square kilometers of dead forest. Thick gray sludge from the mine is visible throughout the Fly River system, although its effects downriver are not as severe. Chemicals from the tailings killed or contaminated fish, although they are still eaten by the people of the surrounding villages. However, fish counts decrease closer to the mine. The massive amount of mine-derived waste dumped into the river exceeded its carrying capacity. This dumping resulted in the river bed being raised 10 m, causing a relatively deep and slow river to become shallower and develop rapids, thereby disrupting indigenous transportation routes. Flooding, caused by the raised riverbed, left a thick layer of contaminated mud on the flood plain among plantations of taro, bananas and sago palm that are the staples of the local diet. About 1300 square kilometers were damaged in this way. The concentration of copper in the water is about 30 times above the standard level, but it is below the World Health Organisation (WHO) standards.</p> <p>The original plans included an Environmental Impact Statement that required a tailings dam be built. This would allow heavy metals and solid particles to settle, before releasing the clean 'high-water' into the river system where remaining contaminants would be diluted. In 1984 an earthquake caused the half built dam to collapse. The company continued operations without the dam, initially because BHP argued that it would be too expensive to rebuild it. The Ok Tedi Mine was scheduled to close in 2013. However, the PNG Government has taken over control of the mine and with support of local community, the mine life was extended. Experts have predicted that it will take 300 years to clean up the toxic contamination.</p>
Khian Sea Toxic Ash 2 Year Sea Voyage 1986	<p>On August 31, 1986, the cargo ship Khian Sea, registered in Liberia, was loaded with more than 14,000 tons of ash from waste incinerators in Philadelphia, Pennsylvania. The city had previously sent such waste to New Jersey, but that state refused to accept any more after 1984. The company handling the waste (Joseph Paolino and Sons) subcontracted shipment to Amalgamated Shipping Corp and Coastal Carrier Inc, operators of Khian Sea. The latter intended to dump the ash in the Bahamas. However, the Bahamian government turned the ship away, and Philadelphia withheld payment to the companies because the waste was not disposed of. Over the next 16 months, Khian Sea searched all over the Atlantic for a place to dump its cargo. Dominican Republic, Honduras, Panama, Bermuda, Guinea Bissau and the Dutch Antilles refused. Return to Philadelphia failed as well. In January 1988, the crew finally dumped 4,000 tons of the waste near Gonaïves in Haiti as "topsoil fertilizer". When Greenpeace informed the Haitian government of the origin of the waste, the Haitian commerce minister ordered the crew to reload the ash but the ship slipped away. The Haitian government banned all waste imports. Local cleanup crews later buried some of the waste in a bunker inland, but the rest remained on the beach. Next the crew of Khian Sea tried to unload the rest of the cargo in Senegal, Morocco, Yugoslavia, Sri Lanka and Singapore. After repairs in Yugoslavia, the ship's name changed to Felicia, and registered in Honduras. Later it was renamed Pelicano. These changes failed to hide the ship's original identity. The rest of the ash disappeared en route from Singapore to Sri Lanka in November 1988. The crew refused to comment but eventually the ship's captain admitted that they had dumped the remaining 10,000 tons of the waste into the Atlantic and Indian Oceans.</p>
Sandoz Chemical Spill Switzerland 1986	<p>The Sandoz chemical spill was a major environmental disaster caused by a fire and its subsequent extinguishing at Sandoz agrochemical storehouse in Schweizerhalle, Basel-Landschaft, Switzerland, on 1 November 1986, which released toxic agrochemicals into the air and resulted in tons of pollutants entering the Rhine river, turning it red. The chemicals caused a massive mortality of wildlife downstream, killing among other things a large proportion of the European eel population in the Rhine, although the situation subsequently recovered within a couple of years. The stored chemicals included, urea, fluorescent dye, organophosphate insecticides, mercury compounds and organochlorines. Among the major resulting water pollutants were dinitro-ortho-cresol, the organophosphate chemicals propetamphos, parathion, disulfoton, thiometon, etrimphos and fenitrothion, as well as the organochlorine metoxuron. The cause of the blaze was never established. In 2000 Vincent Cannistraro, a former senior U.S. intelligence official, stated that the Soviet KGB had ordered the East German Stasi to sabotage the chemical factory. According to him, the</p>

	operation's objective was to distract attention from the Chernobyl disaster six months earlier in the Soviet Union.
Picher Lead Poisoning 1980s-1996	Picher is a ghost town and former city in Ottawa County, Oklahoma, United States. This was a major national center of lead and zinc mining at the heart of the Tri-State Mining District. More than a century of unrestricted subsurface excavation dangerously undermined most of Picher's town buildings and left giant piles of toxic metal-contaminated mine tailings (known as chat) heaped throughout the area. The discovery of the cave-in risks, groundwater contamination, and health effects associated with the chat piles and subsurface shafts resulted in the site being included in 1980 in the Tar Creek Superfund Site by the US Environmental Protection Agency. The state collaborated on mitigation and remediation measures, but a 1996 study found that 34% of the children in Picher suffered from lead poisoning due to these environmental effects, which could result in lifelong neurological problems. Eventually the EPA and the state of Oklahoma agreed to a mandatory evacuation and buyout of the entire township. The similarly contaminated satellite towns of Treece, Kansas and Cardin, Oklahoma were included in the Tar Creek Superfund site.
Powell River Coal Slurry Spill October 1996	The Powell River coal slurry spill occurred in October 1996, when an impoundment at a coal processing plant in Virginia failed releasing 6,000,000 gallons of coal slurry into the Powell River. The spill extended more than 20 miles downstream and contained a range of coal mining contaminants. The Powell River watershed is part of the Upper Tennessee River Basin, which was designated by U.S. Fish and Wildlife as one of the United States's most biologically diverse aquatic ecosystems.
The Doñana Disaster April 25, 1998	<p>The Doñana Disaster, also known as the Aznalcollar Disaster or Guadamar Disaster (Sp: Desastre de Aznalcóllar, Desastre del Guadamar), was an industrial accident in Andalusia, southern Spain. On 25 April 1998, a holding dam burst at the Los Frailes mine, near Aznalcóllar, Seville Province, releasing 4–5 million cubic metres of mine tailings. The acidic tailings, which contained dangerous levels of several heavy metals, quickly reached the nearby River Agrio, and then its affluent the River Guadamar, travelling about 40 kilometres along these waterways before they could be stopped. The Guadamar is the main water source for the Doñana National Park, a UNESCO World Heritage Site and one of the largest national parks in Europe.</p> <p>As a result of the ecological disaster, nothing survived because of the high acidity of the waste, which contained a mixture of lead, copper, zinc, cadmium and other metals, along with sulphides. The industrial disaster led to a chain of serious environmental issues in the Andalusia region. A not very visible toxic chain spread through the nature which was difficult to break down. High levels of heavy metals are still embedded in soil and water and have found a way into the wildlife. Another major problem lies in the health of the animals that lived around the park. In this mixture of swamps and woodlands, 300 species of birds breed, feed or stop over on their migratory route between Northern Europe and Africa. However, this migration soon came to an end when the dam exploded; almost 2,000 birds, chicks, eggs, and nests were killed or destroyed and more than 25,000 kilos of dead fish were collected in the aftermath.</p>
The Dioxin Affair of 1999	In 1999, the Dioxin Affair occurred when 50 kg of PCB transformer oils were added to a stock of recycled fat used for the production of 500 tonnes of animal feed, eventually affecting around 2,500 farms in several countries. The name Dioxin Affair was coined from early misdiagnosis of dioxins as the primary contaminants, when in fact they turned out to be a relatively small part of the contamination caused by thermal reactions of PCBs. The PCB congener pattern suggested the contamination was from a mixture of Aroclor 1260 & 1254. Over 9 million chickens, and 60,000 pigs were destroyed because of the contamination. Two businessmen who knowingly sold the contaminated feed ingredient received two-year suspended sentences for their role in the crisis.
2000 Baia Mare cyanide spill January 30, 2000	The 2000 Baia Mare cyanide spill was a leak of 3,500,000 cu ft of cyanide contaminated water near Baia Mare, Romania, into the Someş River by the gold mining company Aurul, a joint-venture of the Australian company Esmeralda Exploration and the Romanian government. The polluted waters eventually reached the Tisza and then the Danube, killing large numbers of fish in Hungary and Yugoslavia. The spill has been called the worst environmental disaster in Europe since the Chernobyl disaster. Large quantities of fish died due to the toxicity of cyanide in the waters of the rivers, affecting 62 species of fish, of which 20 are protected species. The Romanian government claimed that the fish had died of cold, and they were not at fault. Two years after the spill, the ecosystem began to recover, but it was still far from its initial state; the fishermen of Hungary claimed that their catches in 2002 were only at a fifth of their original levels. Five weeks later, a spill of contaminated waters (this time with heavy metals) hit the region. A dyke burst in Baia Borşa, Maramureş County and 20,000 cubic metres of zinc, lead and copper-contaminated water made its way into the Tisza.
Martin County Coal Slurry Spill October 11, 2000	The Martin County coal slurry spill was an accident that occurred after midnight on October 11, 2000 when the bottom of a coal slurry impoundment owned by Massey Energy in Martin County, Kentucky, USA, broke into an abandoned underground mine below. The slurry came out of the mine openings, sending an estimated 306,000,000 US gallons (1.16×10 ⁹ l; 255,000,000 imp gal) of slurry down two tributaries of the Tug Fork River. By morning, Wolf Creek was oozing with the black waste; on Coldwater Fork, a 10-foot (3.0 m) wide stream became a 100-yard (91 m) expanse of thick

	<p>slurry.</p> <p>The spill was over five feet deep in places and covered nearby residents' yards. The spill polluted hundreds of miles (300 – 500 km) of the Big Sandy River and its tributaries and the Ohio River. The water supply for over 27,000 residents was contaminated, and all aquatic life in Coldwater Fork and Wolf Creek was killed. The spill was 30 times larger than the Exxon Valdez oil spill (12 million US gallons (45,000 m³)) and one of the worst environmental disasters ever in the southeastern United States, according to the United States Environmental Protection Agency.</p>
Al-Mishraq Sulfur Plant Fire June 2003	<p>Al-Mishraq is a state run sulfur plant near Mosul, Iraq. In June 2003, it was the site of the largest human-made release of sulfur dioxide ever recorded when a fire (thought to have been deliberately started) gained control and burned for about three weeks. At its height, the fire was putting 21,000 tons of sulfur dioxide a day into the atmosphere. The pollution in Mosul, which is about 45 kilometres from Mishraq, reached a catastrophic level. For over 48 hours the white smoke from sulfur dioxide could be seen in the air. Many people were taken into hospitals and most vegetation was killed. On 22 October 2016, the plant was set alight by ISIL militants as part of the Battle of Mosul. Two civilians died and nearly 1,000 people were treated for toxic gas inhalation. Shifting winds sent the gas to Qayyarah Airfield West, where U.S. and coalition forces were forced to use gas masks.</p>
2003 Horse Meat Scandal	<p>The 2013 horse meat scandal was a scandal in Europe in which foods advertised as containing beef were found to contain undeclared or improperly declared horse meat – as much as 100% of the meat content in some cases. A smaller number of products also contained other undeclared meats, such as pork. The issue came to light on 15 February 2013, when it was reported that horse DNA had been discovered in frozen beefburgers sold in several Irish and British supermarkets. Horse meat is not harmful to health and is eaten in many countries. The analysis stated that 23 out of 27 samples of beef burgers also contained pig DNA. While the presence of undeclared meat was not a health issue, the scandal revealed a major breakdown in the traceability of the food supply chain, and the risk that harmful ingredients could have been included as well. Sports horses, for example, could have entered the food supply chain, and with them the veterinary drug phenylbutazone which is banned in food animals. The scandal has since spread to 13 other European countries, and European authorities have decided to find an EU-wide solution.</p> <p>Of 27 beef burger products tested, 37% were positive for horse DNA, and 85% were positive for pig DNA. Of 31 beef meal products tested, 21 were positive for pig DNA but all were negative for horse DNA. 19 salami products were tested but were negative for all foreign DNA. Of the 37% of beef products tested positive for horse DNA, Tesco's inexpensive Everyday Value Beef Burgers tested at 29.1%. All other reported brands had less than 0.3% horse DNA. These products originated from Liffey Meats and Silvercrest Foods in Ireland and Dalepak Hambleton food processing plant in the United Kingdom. Trace amounts of horse DNA were also found in raw ingredients imported from Spain and the Netherlands. Laboratory DNA investigations were requested by the authorities into possible donkey meat adulteration of minced meat products labelled as 100% beef.</p>
Hurricane Katrina Toxic Water Pumping September 2005	<p>On September 5, 2005, the Army Corps of Engineers started to fix levee breaches by dropping huge sandbags from Chinook helicopters. The London Avenue Canal and Industrial Canal were blocked at the lake as permanent repairs started. On September 6, the Corps began pumping flood water back into the lake after seven days in the streets of New Orleans. Because it was fouled with dead animals, sewage, heavy metals, petrochemicals, and other dangerous substances, the Army Corps worked with the U.S. Environmental Protection Agency and Louisiana Department of Environmental Quality (LDEQ) to avoid major contamination and eutrophication of the lake. Aerial photography suggests that 25 billion US gallons (95,000,000 m³) of water covered New Orleans as of September 2, which equals about 2% of Lake Pontchartrain's volume. Due to a lack of electric power, the city was unable to treat the water before pumping it into the lake. It is unclear how long the pollution will persist and what its environmental damage to the lake will be, or what the long-term health effects will be in the city from mold and other contamination.</p>
Kingston Fossil Plant Coal Fly Ash Slurry Spill December 22, 2008	<p>The TVA Kingston Fossil Plant coal fly ash slurry spill occurred just before 1 a.m. on Monday December 22, 2008, when an ash dike ruptured at an 84-acre (0.34 km²) solid waste containment area at the Tennessee Valley Authority's Kingston Fossil Plant in Roane County, Tennessee, USA. 1,100,000,000 US gallons (4,200,000 m³) of coal fly ash slurry was released. The coal-fired power plant, located across the Clinch River from the city of Kingston, uses ponds to dewater the fly ash, a byproduct of coal combustion, which is then stored in wet form in dredge cells. The slurry (a mixture of fly ash and water) traveled across the Emory River and its Swan Pond embayment, on to the opposite shore, covering up to 300 acres (1.2 km²) of the surrounding land, damaging homes and flowing up and down stream in nearby waterways such as the Emory River and Clinch River (tributaries of the Tennessee River). It was the largest fly ash release in United States history.</p> <p>Depending upon the source and makeup of the coal being burned, the components of fly ash vary considerably, but all fly ash includes substantial amounts of silicon dioxide (SiO₂) (both amorphous</p>

	<p>and crystalline), aluminium oxide (Al₂O₃) and calcium oxide (CaO), the main mineral compounds in coal-bearing rock strata.</p> <p>Constituents depend upon the specific coal bed makeup but may include one or more of the following elements or substances found in trace concentrations (up to hundreds ppm): arsenic, beryllium, boron, cadmium, chromium, hexavalent chromium, cobalt, lead, manganese, mercury, molybdenum, selenium, strontium, thallium, and vanadium, along with very small concentrations of dioxins and PAH compounds.</p> <p>In the past, fly ash was generally released into the atmosphere, but air pollution control standards now require that it be captured prior to release by fitting pollution control equipment. In the US, fly ash is generally stored at coal power plants or placed in landfills. About 43% is recycled, often used as a pozzolan to produce hydraulic cement or hydraulic plaster and a replacement or partial replacement for Portland cement in concrete production. Pozzolans ensure the setting of concrete and plaster and provide concrete with more protection from wet conditions and chemical attack.</p>
2008 Peanut Butter Salmonella Scandal	<p>In late 2008 and early 2009, as a result of the Salmonella contamination event, 9 people died and at least 714 people (half of them children) fell ill, all from food poisoning after eating products containing contaminated peanuts. This contamination triggered the most extensive food recall in U.S. history up to that time, involving 46 states, more than 360 companies, and more than 3,900 different products manufactured using PCA ingredients. The contamination and recall had immediate major ramifications for the market of this set of farm products, and further impact on public perceptions of food safety and on government regulation of the same. On February 13, 2009, Peanut Corporation of America ceased all manufacturing and business operations, and filed for Chapter 7 bankruptcy liquidation.</p> <p>In July 2015, federal authorities recommended a sentence of life imprisonment for Parnell. On September 21, 2015, Parnell was sentenced to 28 years in prison, the longest punishment ever handed out to a producer in a U.S. foodborne illness case. His brother Michael Parnell was sentenced to 20 years, and the plant's former quality assurance manager Mary Wilkerson was sentenced to five years. On October 1, 2015, the court sentenced Samuel Lightsey to three years in prison and Daniel Kilgore to six years in prison. U.S. District Judge W. Louis Sands stated during sentencing, "We place faith that no one would intentionally ship products to market that are contaminated.... Consumers are at the mercy of food producers for the safety of the products. These acts [of the convicted PCA executives] were driven by profit and the protection of profit ... thus greed." Sands told Stewart Parnell that he had "taken risks for years," that they were "eventually discovered and traced back" to his corporation, and that, unfortunately, "thousands of people suffered and nine died" from Parnell's knowing disregard for public health and safety.</p>
2008 Chinese Milk Scandal	<p>In September 2008, several companies, including Nestlé, were implicated in a scandal involving milk and infant formula which had been adulterated with melamine, leading to kidney stones and other renal failure, especially among young children. By December 2008, nearly 300,000 people had become ill, with more than 50,000 infant hospitalizations and six infant deaths. In a study published in the New England Journal of Medicine, it was reported that melamine exposure increased the incidence of urinary tract stones by seven times in children. Melamine may have been added to fool government protein content tests after water was added to fraudulently dilute the milk. Because of melamine's high nitrogen content (66% by mass versus approx. 10–12% for typical protein), it can cause the protein content of food to appear higher than the true value. Officials estimate that about 20 percent of the dairy companies tested in China sell products tainted with melamine. On January 22, 2009, three of those involved in the scandal (including one conditional sentence) were sentenced to death in a Chinese court. In October 2008, "Select Fresh Brown Eggs" exported to Hong Kong from the Hanwei Group in Dalian in northeastern China, were found to be contaminated with nearly twice the legal limit of melamine.</p>
Volkswagen Emissions Scandal 2008-2015	<p>The Volkswagen emissions scandal (also called "emissionsgate" or "dieselgate") started on 18 September 2015, when the United States Environmental Protection Agency (EPA) issued a notice of violation of the Clean Air Act to German automaker Volkswagen Group. The agency had found that Volkswagen had intentionally programmed turbocharged direct injection (TDI) diesel engines to activate certain emissions controls only during laboratory emissions testing. The programming caused the vehicles' NO_x output to meet US standards during regulatory testing but emit up to 40 times more NO_x in real-world driving. Volkswagen deployed this programming in about eleven million cars worldwide, and 500,000 in the United States, during model years 2009 through 2015. The VW scandal more generally raised awareness over the high levels of pollution being emitted by diesel vehicles built by a wide range of carmakers, including Volvo, Renault, Mercedes, Jeep, Hyundai, Citroen, BMW, Mazda, Fiat, Ford and Peugeot. Independent tests carried out by ADAC proved that, under normal driving conditions, diesel vehicles including the Volvo S60, Renault's Espace Energy and the Jeep Renegade, exceeded legal European emission limits for nitrogen oxide (NO_x) by more than 10 times. Researchers have criticized the inadequacy of current regulations and</p>

	<p>called for the use of a UN-sanctioned test called Worldwide harmonized Light vehicles Test Procedures that better reflects real-life driving conditions. The test is not due to come into force until 2017, with critics saying that car firms have lobbied fiercely to delay its implementation due to the high cost of meeting stricter environmental controls.</p> <p>The VW scandal has increased scrutiny on combustion engines in general, and VW and several other car makes have been shown to pollute more than allowed. A French government report in 2016 investigated 86 different cars, and about 1/5th of those were found to comply with emission laws. Most did not. A car was measured to emit 17 times more than allowed. An overview of tests showed that cars turned off the exhaust improvement device in many ordinary conditions, with 5 out 38 cars complying with regulations in an English test. A German test showed 10 out of 53 cars compliant when exposed to temperatures below 10 degrees Celsius. A French test showed 4 out of 52 cars compliant when tested outside (not in a laboratory). A 2016 test showed VW diesel cars to emit at about twice the Euro6 limit, and several other manufacturers emitting more, up to 14 times higher. 38 out of 40 tested diesel cars failed a NOx-test since 2016.</p>
<p>Deepwater Horizon Oil Spill – April 20, 2010 September 19, 2010</p>	<p>The Deepwater Horizon oil spill (also referred to as the BP oil spill, the BP oil disaster, the Gulf of Mexico oil spill, and the Macondo blowout) began on April 20, 2010, in the Gulf of Mexico on the BP-operated Macondo Prospect. Killing eleven people, it is considered the largest marine oil spill in the history of the petroleum industry and estimated to be 8% to 31% larger in volume than the previous largest, the Ixtoc I oil spill. The US Government estimated the total discharge at 4.9 million barrels. After several failed efforts to contain the flow, the well was declared sealed on September 19, 2010. Reports in early 2012 indicated the well site was still leaking.</p> <p>A massive response ensued to protect beaches, wetlands and estuaries from the spreading oil utilizing skimmer ships, floating booms, controlled burns and 1.84 million US gallons (7,000 m3) of Corexit oil dispersant. Due to the months-long spill, along with adverse effects from the response and cleanup activities, extensive damage to marine and wildlife habitats and fishing and tourism industries was reported. In Louisiana, 4,900,000 pounds (2,200 t) of oily material was removed from the beaches in 2013, over double the amount collected in 2012. Oil cleanup crews worked four days a week on 55 miles (89 km) of Louisiana shoreline throughout 2013. Oil continued to be found as far from the Macondo site as the waters off the Florida Panhandle and Tampa Bay, where scientists said the oil and dispersant mixture is embedded in the sand. In 2013 it was reported that dolphins and other marine life continued to die in record numbers with infant dolphins dying at six times the normal rate. One study released in 2014 reported that tuna and amberjack that were exposed to oil from the spill developed deformities of the heart and other organs that would be expected to be fatal or at least life-shortening and another study found that cardiotoxicity might have been widespread in animal life exposed to the spill. In July 2015, BP agreed to pay \$18.7 billion in fines, the largest corporate settlement in U.S. history.</p> <p>"Disturbing numbers" of mutated fish were seen in the Gulf. Scientists and fishermen are pointing to the spill, the dispersants and chemicals used in its cleanup as the cause of these deformities which include shrimp born without eyes, fish with lesions, fish with oozing sores and, according to a local fisherwoman, "We are also finding eyeless crabs, crabs with their shells soft instead of hard, full grown crabs that are one-fifth their normal size, clawless crabs, and crabs with shells that don't have their usual spikes ... they look like they've been burned off by chemicals". The dispersants are known to be mutagenic. In Barataria Bay, Louisiana, an area "heavily impacted by oil and dispersants", 50% of shrimp were found lacking eyes and eye sockets. Another lifelong fisher-woman reported seeing "fish without covers over their gills and others with large pink masses hanging off their eyes and gills". A 2014 study of the effects of the oil spill on bluefin tuna, published in the journal Science, found that oil already broken down by wave action and chemical dispersants was more toxic than fresh oil. The use of dispersant made oil sink faster and more deeply into the beaches, and possibly groundwater supplies, according to a November 2012 a study released by Florida State University and Utrecht University in the Netherlands. The researchers found that Corexit 9500A allowed the PAHs to permeate sand where, due to a lack of sunlight, degradation is slowed. A 2014 bluefin tuna study in Science found that oil already broken down by wave action and chemical dispersants was more toxic than fresh oil. A 2015 study of the relative toxicity of oil and dispersants to coral also found that the dispersants were more toxic than the oil.</p> <p>The oil from the disaster affected between 622 and 1300 miles of the United States coastline around the Gulf of Mexico and has acutely catalyzed the erosion of land due to the oil having led to the death of most of the marsh vegetation (flora). A 2012 study of the sands of the contaminated beaches and marshes showed that the variety of organisms, one of the lowest links in the food chain, had dropped dramatically since the spill. In August 2010, scientists had determined as up to 79% of the spilled oil remained in the Gulf of Mexico, under the surface. In March 2011, it was reported that thousands of pounds of oil and dispersant were collected each day from highly visible resort areas</p>

	and that 17,000 lb (7,700 kg) were collected from a beach in Alabama after a winter storm.
Ajka Alumina Sludge Spill October 4, 2010	The Ajka alumina sludge spill was an industrial accident at a caustic waste reservoir chain of the Ajkai Timföldgyár alumina plant in Ajka, Veszprém County, in western Hungary. On 4 October 2010, the northwestern corner of the dam of reservoir no. 10 collapsed, freeing approximately 35,000,000 cubic feet of liquid waste from red mud lakes. The mud was released as a 3–7 ft wave, flooding several nearby localities, including the village of Kolontár and the town of Devecser. Ten people died, and 150 people were injured. About 15 sq mi of land were initially affected. The spill reached the Danube on 7 October 2010. Hungarian Prime Minister Viktor Orbán stated that the cause of the spill was presumably human error.
Mount Polley Mine Waste Spill August 4, 2014	<p>The Mount Polley mine disaster is an environmental disaster in the Cariboo region of central British Columbia, Canada, that began 4 August 2014 with a breach of the Imperial Metals-owned Mount Polley copper and gold mine tailings pond, releasing its water and slurry with years worth of mining waste into Polley Lake. The spill flooded Polley Lake, its outflow Hazelton Creek, and continued into nearby Quesnel Lake and Cariboo River. By 8 August the four square kilometres sized tailings pond had been emptied of the majority of supernatant (process water) that sits atop the settled solids (mining waste, or 'tailings'). Water tests showed elevated levels of selenium, arsenic and other metals similar to historical tests before the disaster. The cause of the dam break has been investigated with a final report published 31 January 2015. Imperial Metals had a history of operating the pond beyond capacity since at least 2011 .</p> <p>According to an Imperial Metals summary filed with Environment Canada in 2013 "there was 326 tonnes of nickel, over 400 tonnes of arsenic, 177 tonnes of lead and 18,400 tonnes of copper and its compounds placed in the tailings pond [last year]". At a community meeting on 5 August 2014, president of Imperial Metals, Brian Kynoch, claimed the water in the tailings pond was almost potable, "though the silt, the "ground-up rock" left over after extracting the metals" posed a problem. Water, sediment, and fish in Polley and Quesnel Lake are monitored by BC government staff. Fish sampling revealed elevated levels of selenium, that exceed guidelines for human consumption as well as elevated levels of arsenic and copper not considered a threat to human health. These levels were similar to levels found in 2013 before the tailings breach, and considered likely due to local geology. Sediment testing near the tailings spill revealed elevated concentrations of copper, iron, manganese, arsenic, silver, selenium and vanadium. The government said tests in May 2014, before the tailings release, had shown elevated levels of the same elements. The extent of the damage is predicted to "remain unknown for years or even decades", as toxicants slowly accumulate in the environment. It should be noted however, that the geological nature of the tailings is such that the minerals present in the tailings will not readily dissolve into the waters affected as the pH of the waters is not low enough to promote dissolution of the minerals and therefore would lessen their bio-availability.</p>
Elk River Chemical Spill January 9, 2014	<p>The Elk River chemical spill occurred on January 9, 2014 when 7,500 gallons of crude 4-methylcyclohexanemethanol (MCHM) was released from a Freedom Industries facility into the Elk River, a tributary of the Kanawha River, in Charleston in the U.S. state of West Virginia. The chemical spill occurred upstream from the principal West Virginia American Water intake and treatment and distribution center. Following the spill, up to 300,000 residents within nine counties in the Charleston, West Virginia metropolitan area were without access to potable water.</p> <p>Freedom Industries' release of crude MCHM into the Elk River was the third major chemical accident to occur in the Kanawha Valley in five years. In 2008, an explosion and fire occurred at a Bayer CropScience facility in Institute, killing two employees. In 2010, toxic gas was released at the DuPont facility in Belle. Following these incidents, a team of expert officials from the U.S. Chemical Safety and Hazard Investigation Board (CSB) conducted investigations and contacted West Virginia state authorities in 2011 to establish a program to prevent chemical accidents and releases throughout the Kanawha River valley, known as "Chemical Valley" for its history of chemical processing, production, and resulting pollution. The CSB recommended that the safety program be headed by Dr. Rahul Gupta, the executive director for the Kanawha-Charleston Health Department. The West Virginia Legislature and West Virginia state government did not execute the CSB's recommendations.</p>
Gold King Mine Waste Water Spill August 5, 2015	<p>The 2015 Gold King Mine waste water spill was an environmental disaster that began at the Gold King Mine near Silverton, Colorado, when EPA personnel, along with workers for Environmental Restoration LLC (a Missouri company under EPA contract to mitigate pollutants from the closed mine), caused the release of toxic waste water into the Animas River watershed. They caused the accident while attempting to drain ponded water near the entrance of the mine on August 5. The maintenance by the EPA was necessary because local jurisdictions had previously refused Superfund money to fully remediate the regions' derelict mines, due to a fear of lost tourism. After the spill, the Silverton Board of Trustees and the San Juan County Commission approved a joint resolution seeking Superfund money.</p> <p>Contractors accidentally destroyed the plug holding water trapped inside the mine, which caused an overflow of the pond, spilling 3,000,000 US gallons (11 ML) of mine waste water and tailings,</p>

	including heavy metals such as cadmium and lead, and other toxic elements, such as arsenic, beryllium, zinc, iron and copper into Cement Creek, a tributary of the Animas River in Colorado. The EPA was criticized for not warning Colorado and New Mexico about the operation until the day after the waste water spilled, despite the fact the EPA employee "in charge of Gold King Mine knew of blowout risk."
Bento Rodrigues Dam Disaster November 5, 2015	The Bento Rodrigues dam disaster occurred on November 5, 2015, when an iron ore tailings dam in Bento Rodrigues, a subdistrict of Mariana, Brazil, suffered a catastrophic failure, causing flooding and at least 17 deaths and 16 injuries. About 60,000,000 cubic meters of iron waste flowed into the Doce River. Toxic brown mudflows reached the Atlantic Ocean 17 days later. The total impact and environmental consequences to the river and the beaches near its mouth, or to the wildlife are still unclear. This incident has been described as the worst environmental disaster in Brazil's history. At around 6:30pm on the day of 5 November, the tailings of iron ore reached the Rio Doce. The river basin has a drainage area of about 86,715 square kilometers, with 86% in Minas Gerais and Espírito Santo. In total, the river covers 230 municipalities that use its bed for subsistence.
Aliso Canyon Gas Leak California October 23, 2015 – February 18, 2016	The Aliso gas leak's carbon footprint is said to be larger than the Deepwater Horizon leak in the Gulf of Mexico. An estimated 97,100 tonnes (95,600 long tons; 107,000 short tons) of methane and 7,300 tonnes (7,200 long tons; 8,000 short tons) of ethane were released into the atmosphere, making it the worst single natural gas leak in U.S. history in terms of its environmental impact.
2017 Fipronil Egg Contamination Scandal	<p>The 2017 Fipronil eggs contamination is an incident in Europe and Asia involving the spread of fipronil insecticide which contaminated human consumed chicken eggs and egg products. Chicken eggs were found to contain fipronil and distributed to 15 European Union countries, Switzerland, and Hong Kong. Approximately 700,000 eggs are thought to have reached shelves in the UK alone. Fipronil contaminated eggs may have been sold for a long time prior to the discovery of high levels. Fipronil was used in a remedy to destroy the poultry mite.</p> <p>Authorities in the Netherlands were alerted by an anonymous source in November 2016 that fipronil was being used in poultry farms, but failed to communicate the findings. In July/August 2017 millions of chicken eggs were blocked from sale or withdrawn from the market in the Netherlands, Belgium, Germany and France after elevated levels of fipronil were discovered by the Dutch food and product safety board. About 180 Dutch farms were temporarily shut down. In early August, Aldi reported removing all eggs for sale in their German stores as a precaution.</p> <p>Early investigation led to two companies: ChickFriend, a provider of pest control services in the Netherlands suspected of knowingly using and selling DEGA-16 mixed with fipronil to hundreds of chicken farmers and Poultry Vision in Belgium accused of selling DEGA-16 mixed with fipronil to ChickFriend. DEGA-16 is a cleaning and sanitising natural product, that is approved to clean chicken stables. The Dutch owners of ChickFriend were arrested during a large-scale operation conducted by Dutch law enforcement agencies on the 10th of August. First results of an investigation by Belgian police led to the discovery of 6 cubic meters of fipronil that Poultry Vision had imported from a chemical manufacturing company in Romania. In South Korea, fipronil contaminated eggs, which were produced in Namyangju, were found by the authority on August 14. E-mart, Homeplus, and Lotte Mart stopped selling eggs temporarily on the same day.</p>
The Four Corners Methane Hot Spot Presently Ongoing	The Four Corners Methane Hot Spot (also called the San Juan Basin methane leak or New Mexico methane source or various related permutations) refers to a clustering of large methane sources near San Juan Basin, near Four Corners, New Mexico, United States. It is perhaps the largest source of methane release in the United States and accounts for about a tenth of the annual gas industry amount. The area has upwards of 40,000 oil and gas wells. The cause of the leak is due to coalbed methane extraction in the area, more specifically more than 250 leaks in the pipelines, processing facilities, gas wells, and storage tanks. A recent NASA study reported that each year 590,000 metric tons of methane gas was emitted into the atmosphere as a result of the leaks.
SOURCE: Wikipedia (with some corrections, additions, and other edits), NASA (233)	

These are just some of the known intentional depredations done by corporations, how many thousands of other similar instances have occurred without anyone even knowing? How much toxic waste has been dumped into the oceans or buried in the soils of the Earth to temporarily hide the unavoidable consequences and is only waiting to be rediscovered in the future? How much less polluted would the atmosphere have been if the electric streetcar systems were allowed to continue expanding and were not purposely destroyed by the corporations promoting fossil fuel? Should not the greedy, thieving, and polluting corporations be made to clean up these toxic messes they have created and continue to make? Should these corporations not be held responsible for the current toxic state of the Earth? If corporations have corporate personhood with similar rights as *Homo sapiens*, and they want to be treated as *Homo sapiens*, then why is it when someone commits a murder they are incarcerated for life, but when a corporation commits murder, sometimes even on a mass scale, they make a

payout and are free to continue business as usual?

Acid Rain

Acid rain is caused by the emissions of sulfur dioxide and nitrogen oxide into the atmosphere from coal burning for energy production, automobile emissions, and other industrial emissions. And although legislation over the last 30 years has helped to reduce the emissions of sulfur dioxide and nitrogen dioxide, the problem persists and still negatively impacts ecosystems around the world. Dahlgren states,

”Acid deposition has been implicated as a factor contributing to forest decline and surface water acidification in eastern North America and Europe. Acid deposition increased continuously in North America and Europe during the 1900s reaching peak levels in the 1970–1980s. In contrast, acid deposition in northeast Asia has increased rapidly in the past decade due to industrial development and will probably exceed levels observed previously in the most polluted areas of central and eastern Europe. Increased emissions will severely threaten the sustainable basis of many natural and agricultural ecosystems in the region. Although unequivocal evidence directly linking acidic deposition to ecosystem damage may often be lacking, there is considerable data implicating acid deposition with recent deterioration in the health of terrestrial and aquatic ecosystems.” (9)

Oil Spills

Many are familiar with the well-publicized Exxon Valdez oil spill of 1989, but what most don’t realize is that when compared with other oils spills it is relatively small. Most of the thousands of other oil spills have gone virtually unnoticed to the public because of a lack of mainstream news media coverage, and the remote locations of these oil spills. In 2017, there were more than 1,100,000 oil and gas wells (140) in the United States, with an estimated 500,000 additional wells globally, and 79,000 new wells being added in 2013 alone. (139) As a result, from the production, storage, transport, and use of oil between 10,000,000 and 25,000,000 gallons of oil spill each year in the United States alone. (236) For more than 65 years, in the United States, some of the thousands of miles of pipelines carrying natural gas, oil, jet fuel, and other hazardous liquids have leaked their contents into once pristine ecosystems. In the United States, pipelines are often touted as being safe and reliable, and yet there were 44,642 pipeline related accidents or incidents in less than a 50 period. Between 1970 and 2017, there were 19,213 gas distribution incidents and 11,373 gas transmission and gathering incidents. And between 1968 and 2017, there were 14,056 hazardous liquid accidents. (674) The United States Department of Transportation (USDOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) National Pipeline Mapping System gives a good visualization to the extent of these accidents and incidents.

<https://www.npms.phmsa.dot.gov/> Sergei Donskoi, the Russian Natural Resources and Environment minister, said that as a result of a pipeline infrastructure that is 60% deteriorated, more than 1,500,000 tonnes of oil (441,000,000 gallons) are spilled around Usinsk Russia each year. (150) How many more millions of gallons of oil is leaked worldwide during the production, storage, transport, and use phases?

The International Tanker Owners Pollution Federation (ITOPF) has maintained a database of oil spills from tankers, combined carriers and barges since 1970, they reported the following statistics,

”In the 1990s there were 358 spills of 7 tonnes and over, resulting in 1,133,000 tonnes of oil lost;
In the 2000s there were 181 spills of 7 tonnes and over, resulting in 196,000 tonnes of oil lost;
In the six year period 2010-2015 there have been 42 spills of 7 tonnes and over, resulting in 33,000 tonnes of oil lost;” (145)

Based on these numbers and using a gallon conversion rate of 7 barrels of oil per 1 tonne at 42 gallons per barrel, this would total 400,428,000 gallons of oil which have spilt on Earth since the 1990s from tankers, combined carriers, and barges. Since 2004, the Taylor Energy oil well in the Gulf of Mexico has been leaking an estimated 37 to 900 gallons of oil per day and is expected to continue leaking oil for another 100 years, as of 2017 it has leaked out between 175,565 and 4,270,500 gallons of oil. (235) In 100 years it will have leaked between 1,350,500 and 32,850,000 gallons of oil. In 2014, the New York Times investigated the recent North Dakota oil boom and the environmental costs of all the oil being extracted. They stated that,

”Over all, more than 18.4 million gallons of oils and chemicals spilled, leaked or misted into the air, soil and waters of North Dakota from 2006 through early October 2014. (In addition, the oil industry reported spilling 5.2 million gallons of nontoxic substances, mostly fresh water, which can alter the environment and carry contaminants.)” (138)

The following list of massive oil spills does not include every oil spill that has occurred since the use of oil first began, so there are no doubt thousands of more additions which could be added to this list. There are also many undocumented oil spills that have undoubtedly occurred since 1859 when Edwin L. Drake drilled the first commercially productive oil well and oil was pumped out of the ground. There were most likely far more during these early years before technology was invented to limit leakage and spillage during the extraction, processing, and transportation stages. Also, there are the millions of gallons of oil spilt during minor oil spills over the last 100 years by automobile related industries and activities. (e.g. repair shops, retail outlets, automobile accidents, etc.) In addition, there are most likely several million more gallons which has been intentional poured onto Earth by individuals who improperly dispose of used oil in the trash, or simply pour it directly onto the lithosphere or into the hydrosphere. The next time you are in a grocery store, visit the isle where the gallons of water are and do a quick count, how many do you see several hundred maybe at most? Then contemplate the totals previously mentioned and those listed in the table below of around 45,000,000,000 gallons, and then also imagine that it is not water, but rather toxic oil that has been spilled upon the surface of the Earth and killed billions of florae and faunae. If solar and wind power was pursued more earnestly, and government oil subsidies were used instead to invest in and research solar and wind technologies when Bell Labs unveiled the first solar cell more than 60 years ago in 1954, would these oil spills have ever even occurred?

Some of the Massive Oil Spills Over the Last 50 Years		
Source / Location	Date	Estimated Gallons
Kuwaiti oil fires (Oil was burned and spilled)	January 21, 1991 – November 6, 1991	42,000,000,000 to 63,000,000,000
Gulf War oil spill	August 1990 - January 26, 1991	252,000,000
Deepwater Horizon	April 20, 2010 – July 15, 2010	205,000,000
Ixtoc I	June 3, 1979	147,000,000
Atlantic Empress and Aegean Captain	July 19, 1979	87,000,000
Nowruz oil field	February 1983	80,000,000
ABT Summer	May 28, 1991	76,000,000
Castillo de Bellver	August 6, 1983	73,000,000
Amoco Cadiz	March 16, 1978	65,000,000
Torrey Canyon	March 18, 1967	35,000,000
Sea Star	December 19, 1972	34,000,000
Urquiola	May 12, 1976	30,000,000
Braer	January 5, 1993	26,000,000
Prestige	November 13-19, 2002	23,000,000
Aegean Sea	December 3, 1992	21,000,000
Sea Empress	February 15, 1996	18,000,000
Newton Creek	October 5, 1950 - present	17,000,000
World Glory	June 13, 1968	13,000,000
Exxon Valdez	March 24, 1989	12,000,000
Ashland Oil facility	January 2, 1998	4,000,000
Colonial Pipeline	September 2, 1970 – September 9, 2016	2,000,000
SOURCE: Wikipedia (with some corrections, additions, and other edits)		

When one of the first major oil spill occurred in 1967, the British government responded first by bombing the spilled oil with napalm, attempting to incinerate the problem before it washed ashore, and when that failed they sprayed 10,000 tonnes of a highly toxic industrial chemical detergent in an effort to disperse the oil. Ultimately,

the toxic chemical had a more negative impact on the ecosystem than the actual oil spilled and resulted in the deaths of many species of marine flora and fauna. (342) Since that first major oil spill, scientists with the help of new technologies have improved oil spill clean-up efforts, but remediation of an oil spill is still not 100%, and there are always lingering effects years afterward. There is also very little toxicology data on some of the chemicals being used to clean oil spills and known toxic chemicals like COREXIT are used even though the effects and effectiveness are not well understood. During the BP Deepwater Horizon oil spill, more than 5,000,000 litres of toxic dispersants were sprayed to break up the oil, and this was the largest such use of these chemicals in United States history. (396) As is often the case with environmental destruction and remediation, it was ultimately nature which helped to clean much of the BP Deepwater Horizon oil spill. Ocean currents helped to keep the spilled oil offshore while also creating a bacterial bloom by continuously mixing of the water. This bacterial bloom then created *Colwellia*, *Cycloclasticus*, *Oceanospirillales*, *Alcanivorax*, *Methylococcaceae*, and other fossil fuel consuming species, one of which was a species previously unknown to science. (397)



Source: NASA - As Iraqi troops withdrew from Kuwait at the end of the first Gulf War, they set fire to over 650 oil wells and damaged

many more, just south of the Iraq border. Black smoke plumes stream into the skies around Kuwait City in April 1991 five weeks after the fires were set. An estimated 1,000,000,000 to 1,500,000,000 barrels oil (42,000,000,000 to 63,000,000,000 gallons) of oil were released into the environment. After most burned, 25,000,000 to 40,000,000 barrels ended up spread across the desert and 11,000,000 barrels in the Persian Gulf, according to a 2012 paper published in Remote Sensing of Environment. For comparison, the 2010 Deepwater Horizon spill into the Gulf of Mexico is estimated to have released nearly 5 million barrels of oil. Kuwait's landscape has recovered somewhat. Clean up efforts have removed 21,000,000 barrels of oil from the desert, but an estimated 1,000,000 barrels still remain.

https://www.nasa.gov/mission_pages/landsat/news/40th-top10-kuwait.html

Environmental Issues from a Global Perspective

CIA World Factbook 2017: Environment - Current Issues	
Country / Region	Environmental Issue
Afghanistan	Soil degradation; overgrazing; deforestation (much of the remaining forest are being cut down for fuel and building materials); desertification; air and water pollution.
Albania	Deforestation; soil erosion; water pollution from industrial and domestic effluents.
Algeria	Soil erosion from overgrazing and other poor farming practices; desertification; dumping of raw sewage, petroleum refining wastes, and other industrial effluents is leading to the pollution of rivers and coastal waters; Mediterranean Sea, in particular, becoming polluted from oil wastes, soil erosion, and fertilizer runoff.
Andorra	Deforestation; overgrazing of mountain meadows contributes to soil erosion; air pollution; wastewater treatment and solid waste disposal.
Angola	Overuse of pastures and subsequent soil erosion attributable to population pressure; desertification; deforestation of tropical rain forest, in response to both international demand for tropical timber and to domestic use as fuel, resulting in loss of biodiversity; soil erosion contributing to water pollution and siltation of rivers and dams; inadequate supplies of potable water.
Antarctica	In 1998, NASA satellite data showed that the the Antarctic ozone hole was the largest on record, covering 27 million square kilometers; researchers in 1997 found that increased ultraviolet light passing through the hole damages the DNA of icefish, an Antarctic fish species lacking hemoglobin; ozone depletion earlier was shown to harm one-celled Antarctic marine plants; in 2002, significant areas of ice shelves disintegrated in response to regional warming.
Antigua and Barbuda	Water management-a major concern because of limited natural freshwater resources-is further hampered by the clearing of trees to increase crop production, causing rainfall to run off quickly.
Arctic Ocean	Endangered marine species include walruses and whales' fragile ecosystem slow to change and slow to recover from disruptions or damage; thinning polar icepack.
Argentina	Environmental problems (urban and rural) typical of an industrializing economy such as deforestation, soil degradation, desertification, air pollution, and water pollution.
Armenia	Soil pollution from toxic chemicals such as DDT; the energy crisis of the 1990's led to deforestation when citizens scavenged for firewood; pollution of Hrazdan (Razdan) and Aras Rivers; the draining of Sevana Lich (Lake Sevan), a result of its use as a source for hydropower, threatens drinking water supplies; restart of Metsamor nuclear power plant in spite of its location in a seismically active zone.
Ashmore and Cartier Islands	Illegal killing of protected wildlife by traditional Indonesian fisherman, as well as fishing by non-traditional Indonesian vessels, are ongoing problems.
Atlantic Ocean	Endangered marine species include the manatee, seals, sea lions, turtles, whales; drift net fishing is hastening the decline of fish stocks and contributing to international disputes; municipal sludge pollution off eastern US, southern Brazil, and Eastern Argentina; oil pollution in Caribbean Sea, Gulf of Mexico, Lake Maracaibo, Mediterranean Sea, and North Sea; industrial waste and municipal sewage pollution in Baltic Sea, North Sea, and Mediterranean Sea.
Australia	Soil erosion from overgrazing, industrial development, urbanization, and poor farming practices; soil salinity rising due to the use of poor quality water; desertification; clearing for agricultural purposes threatens the natural habitat of many unique animal and plant species; the Great Barrier Reef off the northeast coast, the largest coral reef in the world, is threatened by increased shipping and its popularity as a tourist site; limited natural freshwater resources.
Austria	Some forest degradation caused by air and soil pollution; soil pollution results from the use of agricultural chemicals; air pollution results from emissions by coal-and oil-fired power stations and industrial plants and from trucks transiting Austria between northern and southern Europe.

Azerbaijan	Local scientist consider the Abseron Yasaqligi (Apsheerson Peninsula) (including Baku and Sumquayit) and the Caspian Sea to be the ecologically most devastated area in the world because of severe air, soil, and water pollution; soil pollution results from oil spills, from the use of DDT pesticide, and from toxic defoliants used in the production of cotton.
The Bahamas	Coral reef decay; solid waste disposal.
Bahrain	Desertification resulting from the degradation of limited arable land, periods of drought, and dust storms; coastal degradation (damage to coastlines, coral reefs, and sea vegetation) resulting from oil spills and other discharges from large tankers, oil refineries, and distribution stations; lack of freshwater resources (groundwater and sea water are the only sources for all water needs).
Bangladesh	Many people are landless and forced to live on and cultivate flood-prone land; water borne diseases prevalent in surface water; water pollution, especially of fishing areas, results from the use of commercial pesticides; ground water contaminated by natural arsenic; intermittent water shortages because of falling water tables in the northern and central parts of the country; soil degradation and erosion; deforestation; severe overpopulation.
Barbados	Pollution of coastal waters from waste disposal by ships; soil erosion; illegal solid waste disposal threatens contamination of aquifers.
Belarus	Soil pollution from pesticide use; southern part of the country contaminated with fallout from 1986 nuclear reactor accident at Chornobyl' in northern Ukraine.
Bermuda	Dense population and heavy vehicle traffic create serious pollution problems; water resources scarce (most obtained as rainwater or from wells); there is no sewage treatment on the island.
Belgium	Intense pressures from human activities: urbanization, dense transportation network, industry, extensive animal breeding and crop cultivation; air and water pollution also have repercussions for neighboring countries.
Belize	Deforestation; water pollution from sewage, industrial effluents, agricultural runoff; solid and sewage waste disposal.
Benin	Poaching threatens wildlife populations; deforestation; desertification.
Bermuda	Dense population and heavy vehicle traffic create serious pollution problems; there is no sewage treatment on the island.
Bhutan	Soil erosion.
Bolivia	The clearing of land for agricultural purposes and the international demand for tropical timber are contributing to deforestation; soil erosion from overgrazing and poor cultivation methods (including slash-and-burn agriculture); desertification; loss of biodiversity; industrial pollution of water supplies used for drinking and irrigation.
Bosnia and Herzegovina	Air pollution; deforestation and illegal logging; inadequate wastewater treatment and flood management facilities; sites for disposing of urban waste are limited.
Botswana	Overgrazing; desertification.
Brazil	Deforestation in Amazon Basin destroys the habitat and endangers a multitude of plant and animal species indigenous to the area; there is a lucrative illegal wildlife trade; air and water pollution in Rio de Janeiro, Sao Paulo, and several other large cities; land degradation and water pollution caused by improper mining activities; wetland degradation; severe oil spills.
British Indian Ocean Territory	Wastewater discharge into the lagoon on Diego Garcia.
Bulgaria	Air pollution from industrial emissions; rivers polluted from raw sewage, heavy metals, detergents; deforestation; forest damage from air pollution and resulting acid rain; soil contamination from heavy metals from metallurgical plants and industrial wastes.
Burkina Faso	Recent droughts and desertification severely affecting agricultural activities, population distribution, and the economy; overgrazing; soil degradation; deforestation.
Burma	Deforestation; industrial pollution of air, soil, and water; inadequate sanitation and water treatment contribute to disease.
Burundi	Soil erosion as a result of overgrazing and the expansion of agriculture into marginal lands; deforestation (little forested land remains because of uncontrolled cutting of trees for fuel); habitat loss threatens wildlife populations.

Cabo Verde	Soil erosion; deforestation due to demand for firewood; water shortages; desertification; environmental damage has threatened several species of birds and reptiles; illegal beach sand extraction; overfishing.
Cambodia	Illegal logging activities throughout the country and strip mining for gems in the western region along the border with Thailand have resulted in habitat loss and declining biodiversity (in particular, destruction of mangrove swamps threatens natural fisheries); soil erosion; in rural areas, most of the population does not have access to potable water; declining fish stocks because of illegal fishing and overfishing.
Cameroon	Deforestation; overgrazing; desertification; poaching; overfishing.
Canada	Metal smelting, coal-burning utilities, and vehicle emissions impacting agricultural and forest productivity; air pollution and resulting acid rain severely affecting lakes and damaging forests; ocean waters becoming contaminated due to agricultural, industrial, mining, and forestry activities.
Central African Republic	Poaching has diminished the country's reputation as one of the last great wildlife refuges; desertification; deforestation.
Chad	Improper waste disposal in rural areas contributes to soil and water pollution; desertification.
Chile	Widespread deforestation and mining threaten natural resources; air pollution from industrial and vehicle emissions; water pollution from raw sewage.
China	Air pollution (greenhouse gases, sulfur dioxide particulates) from reliance on coal produces acid rain; China is the world's largest single emitter of carbon dioxide from the burning of fossil fuels; water shortages, particularly in the north; water pollution from untreated wastes; coastal destruction due to land reclamation, industrial development, and aquaculture; deforestation and habitat destruction; poor land management leads to soil erosion, landslides, floods, droughts, dust storms and desertification; trade in endangered species.
Christmas Island	Loss of rainforest; impact of phosphate mining.
Columbia	Deforestation; soil and water quality damage from overuse of pesticides; air pollution, especially in Bogota, from vehicle emissions.
Comoros	Soil degradation and erosion results from crop cultivation on slopes without proper terracing; deforestation.
The Democratic Republic of Congo	Poaching threatens wildlife populations; water pollution; deforestation; soil erosion; mining (diamonds, gold, coltan - a mineral used in creating capacitors for electronic devices) causing environmental damage.
Republic of the Congo	Air pollution from vehicle emissions; water pollution from raw sewage; tap water is not potable; deforestation.
Cook Islands	Limited land presents solid and liquid waste disposal problems; environmental degradation due to unregulated building.
Costa Rica	Deforestation and land use change, largely a result of the clearing of land for cattle ranching and agriculture; soil erosion; coastal marine pollution; fisheries protection; solid waste management; air pollution.
Cote d'Ivoire	Deforestation Most of the country's forests - once the largest in West Africa - have been heavily logged; water pollution from sewage and industrial and agricultural effluents.
Croatia	Air pollution improving but still a concern in urban settings and in emissions arriving from neighboring countries; surface water pollution in the Danube River Basin.
Cuba	Air and water pollution; biodiversity loss; deforestation.
Curacao	Problems in waste management that threaten environmental sustainability on the island include pollution of marine areas from domestic sewage, inadequate sewage treatment facilities, industrial effluents and agricultural runoff, the management of toxic substances, and ineffective regulations.
Cyprus	Water pollution from sewage and industrial wastes; coastal degradation; loss of wildlife habitats from urbanization.
Czechia	Air and water pollution in areas of northwest Bohemia and in northern Moravia around Ostrava present health risks; acid rain damaging forests; efforts to bring industry up to EU code should improve domestic pollution.
Denmark	Air pollution, principally from vehicle and power plant emissions; nitrogen and phosphorus pollution of the North Sea; drinking and surface water becoming polluted from animal wastes and pesticides.
Dhekelia	Netting and trapping of small migrant songbirds in the spring and autumn.
Djibouti	Desertification; endangered species.
Dominica	Water Pollution from chemicals used in farming and from untreated sewage; forests endangered by the expansion of farming activities.

Dominican Republic	Soil eroding into the sea damages coral reefs; deforestation.
Ecuador	Deforestation; soil erosion; desertification; water pollution; pollution from oil production wastes in ecologically sensitive areas of the Amazon Basin and Galapagos Islands.
Egypt	Agricultural land being lost to urbanization and windblown sands; increasing soil salination below Aswan High Dam; desertification; oil pollution threatening coral reefs, beaches, and marine habitats; other water pollution from agricultural pesticides, raw sewage, and industrial effluents; limited natural freshwater resources away from the Nile, which is the only perennial water source; rapid growth in population overstraining the Nile and natural resources.
El Salvador	Deforestation; soil erosion; water pollution; contamination of soils from disposal of toxic wastes.
Equatorial Guinea	Deforestation.
Eritrea	Deforestation; desertification; soil erosion; overgrazing.
Estonia	Air polluted with sulfur dioxide from oil-shale burning power plants in northeast; however, the amounts of pollutants emitted to the air have fallen dramatically and the pollution load of wastewater at purification plants has decreased substantially due to improved technology and environmental monitoring; Estonia has more than 1,400 natural and manmade lakes, the smaller of which in agricultural areas need to be monitored; coastal seawater is polluted in certain locations.
Ethiopia	Deforestation; overgrazing; soil erosion; desertification; water shortages in some areas from water-intensive farming and poor management.
Falkland Islands (Islas Malvinas)	Falkland Islands (Islas Malvinas) Overfishing by unlicensed vessels is a problem; reindeer - introduced to the islands in 2001 from South Georgia - are part of a farming effort to produce specialty meat and diversify the islands' economy; this is the only commercial reindeer herd in the world unaffected by the 1986 Chernobyl disaster.
Faroe Islands	Coastal erosion, landslides and rockfalls, flash flooding, wind storms; oil spills.
Fiji	Deforestation; soil erosion.
Finland	Air pollution from manufacturing and power plants contributing to acid rain; water pollution from industrial wastes, agricultural chemicals; habitat loss threatens wildlife populations.
France	Some forest damage from acid rain; air pollution from industrial and vehicle emissions; water pollution from urban wastes, agricultural runoff.
French Southern and Antarctic Lands	Introduction of foreign species on Iles Crozet has caused severe damage to the original ecosystem; overfishing of Patagonian toothfish around Iles Crozet and Iles Kerguelen.
Gabon	Deforestation; burgeoning population exacerbating disposal of solid waste; oil industry contributing to water pollution; wildlife poaching.
The Gambia	Deforestation; desertification; water-borne diseases prevalent.
Gaza Strip	Desertification; salination of fresh water; sewage treatment; water-borne disease; soil degradation; depletion and contamination of underground water resources.
Georgia	Air pollution, particularly in Rust'avi; heavy pollution of Mtkvari River and the Black Sea; inadequate supplies of potable water; soil pollution from toxic chemicals.
Germany	Emissions from coal-burning utilities and industries contribute to air pollution; acid rain, resulting from sulfur dioxide emissions, is damaging forests; pollution in the Baltic Sea from raw sewage and industrial effluents from rivers in eastern Germany; hazardous waste disposal.
Ghana	Recurrent drought in north severely affects agricultural activities; deforestation; overgrazing; soil erosion; poaching and habitat destruction threatens wildlife populations; water pollution.
Greece	Air pollution; water pollution.
Grenada	Deforestation causing habitat destruction and species loss; coastal erosion and contamination; pollution and sedimentation; inadequate solid waste management.
Guam	Reef damage; inadequate sewage treatment; extermination of native bird populations by the rapid proliferation of the brown tree snake, an exotic, invasive species.
Guatemala	Deforestation in the Peten rainforest; soil erosion; water pollution.
Guernsey	Coastal erosion, coastal flooding; declining biodiversity due to land abandonment and succession to scrub or woodland.

Guinea-Bissau	Deforestation; soil erosion; overgrazing; overfishing.
Guinea	Deforestation; inadequate potable water; desertification; soil contamination and erosion; overfishing, overpopulation in forest region; poor mining practices have led to environmental damage.
Guyana	Water pollution from sewage and agricultural and industrial chemicals; deforestation.
Haiti	Extensive deforestation (much of the remaining forested land is being cleared for agriculture and used as fuel); soil erosion.
Honduras	Urban population expanding; deforestation results from logging and the clearing of land for agricultural purposes; further land degradation and soil erosion hastened by uncontrolled development and improper land use practices such as farming of marginal lands; mining activities polluting Lago de Yojoa (the country's largest source of fresh water), as well as several rivers and streams, with heavy metals.
Hong Kong	Air and water pollution from rapid urbanization.
Iceland	Water pollution from fertilizer runoff; inadequate wastewater treatment.
India	Deforestation; soil erosion; overgrazing; desertification; air pollution from industrial effluents and vehicle emissions; water pollution from raw sewage and runoff of agricultural pesticides; tap water is not potable throughout the country; huge and growing population is overstraining natural resources.
Indian Ocean	Endangered marine species include the dugong, seals, turtles, and whales; oil pollution in the Arabian Sea, Persian Gulf, and Red Sea.
Indonesia	Deforestation; water pollution from industrial wastes, sewage; air pollution in urban areas; smoke and haze from forest fires.
Iran	Air pollution, especially in urban areas, from vehicle emissions, refinery operations, and industrial effluents; deforestation; overgrazing; desertification; oil pollution in the Persian Gulf; wetland losses from drought; soil degradation (salination); water pollution from raw sewage and industrial waste; urbanization.
Iraq	Government water control projects drained most of the inhabited marsh areas east of An Nasiriyah by drying up or diverting the feeder streams and rivers; a once sizable population of Marsh Arabs, who inhabited these areas for thousands of years, has been displaced; furthermore, the destruction of the natural habitat poses serious threats to the area's wildlife populations; inadequate supplies of potable water; development of the Tigris and Euphrates rivers system contingent upon agreements with upstream riparian Turkey; air and water pollution; soil degradation (salination) and erosion; desertification.
Ireland	Water pollution, especially of lakes, from agricultural runoff.
Isle of Man	Waste disposal (both household and industrial); transboundary air pollution.
Israel	Limited arable land and restricted natural freshwater resources; desertification; air pollution from industrial and vehicle emissions; groundwater pollution from industrial and domestic waste, chemical fertilizers, and pesticides.
Italy	Air pollution from industrial emissions such as sulfur dioxide; coastal and inland rivers polluted from industrial and agricultural effluents; acid rain damaging lakes; inadequate industrial waste treatment and disposal facilities.
Jamaica	Heavy rates of deforestation; coastal waters polluted by industrial waste, sewage, and oil spills; damage to coral reefs; air pollution in Kingston from vehicle emissions.
Jan Mayen	Pollutants transported from southerly latitudes by winds, ocean currents, and rivers accumulate in the food chains of native animals.
Japan	Air pollution from power plant emissions results in acid rain; acidification of lakes and reservoirs degrading water quality and threatening aquatic life; Japan is one of the largest consumers of fish and tropical timber, contributing to the depletion of these resources in Asia and elsewhere; following the 2011 Fukushima nuclear disaster, Japan originally planned to phase out nuclear power, but it has now implemented a new policy of seeking to restart nuclear power plants that meet strict new safety standards.
Jersey	Habitat and species depletion due to human encroachment; water pollution; improper solid waste disposal.
Jordan	Deforestation; overgrazing; soil erosion; desertification.
Kazakhstan	Radioactive or toxic chemical sites associated with former defense industries and test ranges scattered throughout the country pose health risks for humans and animals; industrial pollution is severe in some cities; because the two main rivers that flowed into the Aral Sea have been diverted for irrigation, it is drying up and leaving behind a harmful layer of chemical pesticides and natural salts; these substances are then picked up by the wind and blown into noxious dust storms; pollution in the Caspian Sea; soil pollution from

	overuse of agricultural chemicals and salination from poor infrastructure and wasteful irrigation practices.
Kenya	Water pollution from urban and industrial wastes; degradation of water quality from increased use of pesticides and fertilizers; water hyacinth infestation in Lake Victoria; deforestation; soil erosion; desertification; poaching.
Kingman Reef	Illegal foreign fishing; marine debris washing up on reef can entangle and kill wildlife.
Kiribati	Heavy pollution in lagoon of south Tarawa atoll due to heavy migration mixed with traditional practices such as lagoon latrines and open-pit dumping; ground water at risk.
North Korea	Water pollution; waterborne disease; deforestation; soil erosion and degradation.
South Korea	Air pollution in large cities; acid rain; water pollution from the discharge of sewage and industrial effluents; drift net fishing.
Kuwait	Air and water pollution; desertification.
Kyrgyzstan	Water pollution; many people get their water directly from contaminated streams and wells; as a result, water-borne diseases are prevalent; increasing soil salinity from faulty irrigation practices.
Laos	Deforestation; soil erosion.
Lebanon	Deforestation; soil erosion; desertification; air pollution in Beirut from vehicular traffic and the burning of industrial wastes; pollution of coastal waters from raw sewage and oil spills.
Lesotho	Population pressure forcing settlement in marginal areas results in overgrazing, severe soil erosion, and soil exhaustion; desertification; Highlands Water Project controls, stores, and redirects water to South Africa.
Liberia	Tropical rain forest deforestation; soil erosion; loss of biodiversity; pollution of coastal waters from oil residue and raw sewage.
Libya	Desertification; limited natural freshwater resources; the Great Manmade River Project, the largest water development scheme in the world, brings water from large aquifers under the Sahara to coastal cities.
Liechtenstein	Some air pollution generated locally, some transferred from surrounding countries.
Lithuania	Contamination of soil and groundwater with petroleum products and chemicals at military bases
Luxembourg	Air and water pollution in urban areas, soil pollution of farmland
Macau	Air pollution; coastal waters pollution; insufficient policies in reducing and recycling solid wastes; increasing population density worsening noise pollution.
Macedonia	Air pollution from metallurgical plants.
Madagascar	Soil erosion results from deforestation and overgrazing; desertification; surface water contaminated with raw sewage and other organic wastes; several endangered species of flora and fauna unique to the island.
Malawi	Deforestation; land degradation; water pollution from agricultural runoff, sewage, industrial wastes; siltation of spawning grounds endangers fish populations.
Malaysia	Air pollution from industrial and vehicular emissions; water pollution from raw sewage; deforestation; smoke/haze from Indonesian forest fires.
Maldives	Coral reef bleaching.
Mali	Deforestation; soil erosion; desertification; inadequate supplies of potable water.
Marshall Islands	Pollution of Majuro lagoon from household waste and discharges from fishing vessels.
Mauritania	Overgrazing, deforestation, and soil erosion aggravated by drought are contributing to desertification; locust infestation.
Mauritius	water pollution, degradation of coral reefs.
Mexico	Scarcity of hazardous waste disposal facilities; rural to urban migration; natural freshwater resources scarce and polluted in north, inaccessible and poor quality in center and extreme southeast; raw sewage and industrial effluents polluting rivers in urban areas; deforestation; widespread erosion; desertification; deteriorating agricultural lands; serious air and water pollution in the national capital and urban centers along US-Mexico border; land subsidence in Valley of Mexico caused by groundwater depletion.
Federated States of Micronesia	Overfishing, climate change, pollution.
Midway Islands	Small plastic ocean debris mistaken for fish or squid by birds is fed to fledglings resulting in starvation;

	fishing nets that wash ashore entangle wildlife resulting in starvation or strangulation.
Moldova	Heavy use of agricultural chemicals, including banned pesticides such as DDT, has contaminated soil and groundwater; extensive soil erosion from poor farming methods.
Mongolia	The policies of former Communist regimes promoted rapid urbanization and industrial growth that had negative effects on the environment; the burning of soft coal in power plants and the lack of enforcement of environmental laws severely polluted the air in Ulaanbaatar; deforestation, overgrazing, and the converting of virgin land to agricultural production increased soil erosion from wind and rain; desertification and mining activities had a deleterious effect on the environment.
Montenegro	Pollution of coastal waters from sewage outlets, especially in tourist-related areas such as Kotor.
Montserrat	Land erosion occurs on slopes that have been cleared for cultivation.
Morocco	Land degradation/desertification (soil erosion resulting from farming of marginal areas, overgrazing, destruction of vegetation); water supplies contaminated by raw sewage; siltation of reservoirs; oil pollution of coastal waters.
Mozambique	Increased migration of the population to urban and coastal areas with adverse environmental consequences; desertification; pollution of surface and coastal waters; elephant poaching for ivory is a problem.
Namibia	Desertification; wildlife poaching; land degradation has led to few conservation areas.
Nauru	Roof storage tanks collect rainwater but mostly dependent on a single, aging desalination plant; a century of intensive phosphate mining beginning in 1906 - mainly by a UK, Australia, and NZ consortium - left the central 90% of Nauru a wasteland and threatens limited remaining land resources.
Navassa Island	Some coral bleaching.
Nepal	Deforestation (overuse of wood for fuel and lack of alternatives); contaminated water (with human and animal wastes, agricultural runoff, and industrial effluents); wildlife conservation; vehicular emissions.
Netherlands	Water pollution in the form of heavy metals, organic compounds, and nutrients such as nitrates and phosphates; air pollution from vehicles and refining activities; acid rain.
New Caledonia	Erosion caused by mining exploitation and forest fires.
New Zealand	Deforestation; soil erosion; native flora and fauna hard-hit by invasive species.
Nicaragua	Deforestation; soil erosion; water pollution.
Nigeria	Soil degradation; rapid deforestation; urban air and water pollution; desertification; oil pollution - water, air, and soil; has suffered serious damage from oil spills; loss of arable land; rapid urbanization.
Niger	Overgrazing; soil erosion; deforestation; desertification; wildlife populations (such as elephant, hippopotamus, giraffe, and lion) threatened because of poaching and habitat destruction.
Niue	Increasing attention to conservationist practices to counter loss of soil fertility from traditional slash and burn agriculture.
Norfolk Island	Inadequate solid waste management; freshwater obtained through rainwater catchment; deficient electrical network.
Northern Mariana Islands	Contamination of groundwater on Saipan may contribute to disease; clean-up of landfill; protection of endangered species conflicts with development.
Norway	Water pollution; acid rain damaging forests and adversely affecting lakes, threatening fish stocks; air pollution from vehicle emissions.
Oman	Rising soil salinity; beach pollution from oil spills; limited natural freshwater resources.
Pacific Ocean	Endangered marine species include the dugong, sea lion, sea otter, seals, turtles, and whales; oil pollution in Philippine Sea and South China Sea.
Pakistan	Water pollution from raw sewage, industrial wastes, and agricultural runoff; limited natural freshwater resources; most of the population does not have access to potable water; deforestation; soil erosion; desertification.
Pala	Inadequate facilities for disposal of solid waste; threats to the marine ecosystem from sand and coral dredging, illegal fishing practices, and overfishing.
Palmyra Atoll	Invasive plants and insects compete with native biota.
Panama	Water pollution from agricultural runoff threatens fishery resources; deforestation of tropical rain forest; land

	degradation and soil erosion threatens siltation of Panama Canal; air pollution in urban areas; mining threatens natural resources.
Papua New Guinea	Rain forest subject to deforestation as a result of growing commercial demand for tropical timber; pollution from mining projects; severe drought.
Paracel Islands	China's use of dredged sand and coral to build artificial islands harms reef systems; ongoing human activities, including military operations, infrastructure construction, and tourism endangers local ecosystem including birds, fish, marine mammals, and marine reptiles.
Paraguay	Deforestation; water pollution; inadequate means for waste disposal pose health risks for many urban residents; loss of wetlands.
Peru	Deforestation (some the result of illegal logging); overgrazing of the slopes of the costa and sierra leading to soil erosion; desertification; air pollution in Lima; pollution of rivers and coastal waters from municipal and mining wastes.
Philippines	Uncontrolled deforestation especially in watershed areas; soil erosion; air and water pollution in major urban centers; coral reef degradation; increasing pollution of coastal mangrove swamps that are important fish breeding grounds.
Pitcairn Islands	Deforestation (only a small portion of the original forest remains because of burning and clearing for settlement).
Poland	Decreased emphasis on heavy industry and increased environmental concern by post-communist governments has improved environment; air pollution remains serious because of emissions from coal-fired power plants and the resulting acid rain has caused forest damage; water pollution from industrial and municipal sources is also a problem, as is disposal of hazardous wastes.
Portugal	Soil erosion; air pollution caused by industrial and vehicle emissions; water pollution, especially in coastal areas.
Puerto Rico	Soil erosion; occasional drought causing water shortages.
Qatar	Limited natural freshwater resources are increasing dependence on large-scale desalination facilities.
Romania	Soil erosion and degradation; water pollution; air pollution in south from industrial effluents; contamination of Danube delta wetlands.
Russia	Air pollution from heavy industry, emissions of coal-fired electric plants, and transportation in major cities; industrial, municipal, and agricultural pollution of inland waterways and seacoasts; deforestation; soil erosion; soil contamination from improper application of agricultural chemicals; scattered areas of sometimes intense radioactive contamination; groundwater contamination from toxic waste; urban solid waste management; abandoned stocks of obsolete pesticides.
Rwanda	Deforestation results from uncontrolled cutting of trees for fuel; overgrazing; soil exhaustion; soil erosion; widespread poaching.
Saint Helena, Ascension, and Tristan da Cunha	Development threatens unique biota on Saint Helena.
Saint Kitts and Nevis	Deforestation; soil erosion and silting affects marine life on coral reefs; water pollution from uncontrolled dumping of sewage.
Saint Lucia	Deforestation; soil erosion, particularly in the northern region.
Saint Vincent and the Grenadines	Pollution of coastal waters and shorelines from discharges by pleasure yachts and other effluents; in some areas, pollution is severe enough to make swimming prohibitive.
Samoa	Soil erosion, deforestation, invasive species, overfishing.
San Marino	Air pollution; urbanization decreasing rural farmlands.
Sao Tome and Principe	Deforestation; soil erosion and exhaustion.
Saudi Arabia	Desertification; depletion of underground water resources; coastal pollution from oil spills.
Senegal	Wildlife populations threatened by poaching; deforestation; overgrazing; soil erosion; desertification; overfishing.
Serbia	Air pollution around Belgrade and other industrial cities; water pollution from industrial wastes dumped into the Sava which flows into the Danube.
Sierra Leone	Rapid population growth pressuring the environment; overharvesting of timber, expansion of cattle grazing, and slash-and-burn agriculture have resulted in deforestation and soil exhaustion; civil war depleted natural

	resources; overfishing.
Singapore	Industrial pollution; limited natural freshwater resources; limited land availability presents waste disposal problems; seasonal smoke/haze resulting from forest fires in Indonesia.
Sint Maarten	Inadequate solid waste management; pollution from construction, chemical runoff, and sewage harms reefs.
Slovakia	Air pollution from metallurgical plants presents human health risks; acid rain damaging forests.
Slovenia	Sava River polluted with domestic and industrial waste; pollution of coastal waters with heavy metals and toxic chemicals; forest damage from urban air pollution and resulting acid rain.
Solomon Islands	Deforestation; soil erosion; many of the surrounding coral reefs are dead or dying
Somalia	Use of contaminated water contributes to human health problems; deforestation; overgrazing; soil erosion; desertification.
South Africa	Pollution of rivers from agricultural runoff and urban discharge; air pollution resulting in acid rain; soil erosion; desertification.
Southern Ocean	Increased solar ultraviolet radiation resulting from the Antarctic ozone hole in recent years, reducing marine primary productivity (phytoplankton), damaging the DNA of some fish, and causing sun damage to some mammals; large amount of mortality of seabirds resulting from long-line fishing for toothfish; ocean acidification. note: the now-protected fur seal population is making a strong comeback after severe overexploitation in the 18th and 19th centuries.
South Georgia and South Sandwich Islands	Reindeer - introduced to the islands on several occasions in the 20th century - devastated the native flora and bird species; some reindeer were translocated to the Falkland Islands in 2001, the rest were exterminated (2013-14).
Spain	Pollution of the Mediterranean Sea from raw sewage and effluents from the offshore production of oil and gas; air pollution; deforestation; desertification.
Spratly Islands	China's use of dredged sand and coral to build artificial islands harms reef systems; illegal fishing practices indiscriminately harvest endangered species, including sea turtles and giant clams.
Sri Lanka	Deforestation; soil erosion; wildlife populations threatened by poaching and urbanization; coastal degradation from mining activities and increased pollution; freshwater resources being polluted by industrial wastes and sewage runoff; waste disposal; air pollution in Colombo.
Sudan	Inadequate supplies of potable water; wildlife populations threatened by excessive hunting; soil erosion; desertification; periodic drought.
Suriname	Deforestation as timber is cut for export; pollution of inland waterways by small-scale mining activities.
Svalbard	Past exploitation of mammal species (whale, seal, walrus, and polar bear) severely depleted the populations, but a gradual recovery seems to be occurring.
Swaziland	Wildlife populations being depleted because of excessive hunting; overgrazing; soil degradation; soil erosion.
Sweden	Acid rain damage to soils and lakes; pollution of the North Sea and the Baltic Sea.
Switzerland	Air pollution from vehicle emissions and open-air burning; acid rain; water pollution from increased use of agricultural fertilizers; loss of biodiversity.
Syria	Deforestation; overgrazing; soil erosion; desertification; water pollution from raw sewage and petroleum refining wastes.
Taiwan	Air pollution; water pollution from industrial emissions, raw sewage; contamination of drinking water supplies; trade in endangered species; low-level radioactive waste disposal.
Tajikistan	Inadequate sanitation facilities; increasing levels of soil salinity; industrial pollution; excessive pesticides.
Tanzania	Soil degradation; deforestation; desertification; destruction of coral reefs threatens marine habitats; recent droughts affected marginal agriculture; wildlife threatened by illegal hunting and trade, especially for ivory.
Thailand	Air pollution from vehicle emissions; water pollution from organic and factory wastes; deforestation; soil erosion; wildlife populations threatened by illegal hunting.
Timor-Leste	Widespread use of slash and burn agriculture has led to deforestation and soil erosion.
Togo	Deforestation attributable to slash-and-burn agriculture and the use of wood for fuel; water pollution presents health hazards and hinders the fishing industry; air pollution increasing in urban areas.

Tonga	Deforestation results as more and more land is being cleared for agriculture and settlement; some damage to coral reefs from starfish and indiscriminate coral and shell collectors; overhunting threatens native sea turtle populations.
Trinidad and Tobago	Water pollution from agricultural chemicals, industrial wastes, and raw sewage; oil pollution of beaches; deforestation; soil erosion.
Tunisia	Toxic and hazardous waste disposal is ineffective and poses health risks; water pollution from raw sewage; limited natural freshwater resources; deforestation; overgrazing; soil erosion; desertification.
Turkey	Water pollution from dumping of chemicals and detergents; air pollution, particularly in urban areas; deforestation; concern for oil spills from increasing Bosphorus ship traffic.
Turkmenistan	Contamination of soil and groundwater with agricultural chemicals, pesticides; salination, water logging of soil due to poor irrigation methods; Caspian Sea pollution; diversion of a large share of the flow of the Amu Darya into irrigation contributes to that river's inability to replenish the Aral Sea; desertification.
Tuvalu	The use of sand as a building material has led to beachhead erosion; excessive clearance of forest undergrowth for use as fuel; damage to coral reefs from increasing ocean temperatures and acidification; rising sea levels threaten water table; in 2000, the government appealed to Australia and New Zealand to take in Tuvaluans if rising sea levels should make evacuation necessary.
Uganda	Draining of wetlands for agricultural use; deforestation; overgrazing; soil erosion; water hyacinth infestation in Lake Victoria; widespread poaching.
Ukraine	Inadequate supplies of potable water; air and water pollution; deforestation; radiation contamination in the northeast from 1986 accident at Chornobyl' Nuclear Power Plant.
United Arab Emirates	Desertification; beach pollution from oil spills.
United Kingdom	Continues to reduce greenhouse gas emissions, but air pollution remains a concern, particularly in the London region; soil pollution from pesticides and heavy metals; decline in marine and coastal habitats brought on by pressures from housing, tourism, and industry.
United States	Large emitter of carbon dioxide from the burning of fossil fuels; air pollution resulting in acid rain in both the US and Canada; water pollution from runoff of pesticides and fertilizers; limited natural freshwater resources in much of the western part of the country require careful management; desertification.
Uruguay	Water pollution from meat packing/tannery industry; inadequate solid/hazardous waste disposal.
Uzbekistan	Shrinkage of the Aral Sea has resulted in growing concentrations of chemical pesticides and natural salts; these substances are then blown from the increasingly exposed lake bed and contribute to desertification and respiratory health problems; water pollution from industrial wastes and the heavy use of fertilizers and pesticides is the cause of many human health disorders; increasing soil salination; soil contamination from buried nuclear processing and agricultural chemicals, including DDT.
Vanuatu	Deforestation.
Venezuela	Sewage pollution of Lago de Valencia; oil and urban pollution of Lago de Maracaibo; deforestation; soil degradation; urban and industrial pollution, especially along the Caribbean coast; threat to the rainforest ecosystem from irresponsible mining operations.
Vietnam	Logging and slash-and-burn agricultural practices contribute to deforestation and soil degradation; water pollution and overfishing threaten marine life populations; groundwater contamination limits potable water supply; growing urban industrialization and population migration are rapidly degrading environment in Hanoi and Ho Chi Minh City.
Wallis and Futuna	Deforestation (only small portions of the original forests remain) largely as a result of the continued use of wood as the main fuel source; as a consequence of cutting down the forests, the mountainous terrain of Futuna is particularly prone to erosion.
West Bank	Sewage treatment.
World	Large areas subject to overpopulation, industrial disasters, pollution (air, water, acid rain, toxic substances), loss of vegetation (overgrazing, deforestation, desertification), loss of wildlife, soil degradation, soil depletion, erosion; global warming becoming a greater concern.
Yemen	Overgrazing; soil erosion; desertification.
Zambia	Air pollution and resulting acid rain in the mineral extraction and refining region; chemical runoff into watersheds; poaching seriously threatens rhinoceros, elephant, antelope, and large cat populations; deforestation; soil erosion; desertification.

Zimbabwe	Deforestation; soil erosion; land degradation; air and water pollution; the black rhinoceros herd - once the largest concentration of the species in the world - has been significantly reduced by poaching; poor mining practices have led to toxic waste and heavy metal pollution.
SOURCE: CIA WORLD FACT BOOK 2017 - https://www.cia.gov/library/publications/the-world-factbook/	

CHAPTER IV.

Denial of Global Warming and other Environmental Issues

Disbelief and Denial

Ever since Svante Arrhenius proposed the greenhouse effect in 1896, some *Homo sapiens* have continuously rejected and criticized global warming and those which have scientifically proven it. Two thousand years ago naturalists Theophrastus and Pliny the Elder both alluded to Europe's warming trend. (187) And in 1787, Thomas Jefferson also made observations of unusual global warming when he wrote,

"A change in our climate however is taking place very sensibly. Both heats and colds are become much more moderate within the memory even of the middle-aged. Snows are less frequent and less deep. They do not often lie, below the mountains, more than one, two, or three days, and very rarely a week. They are remembered to have been formerly frequent, deep, and of long continuance. The elderly inform me the earth used to be covered with snow about three months in every year. The rivers, which then seldom failed to freeze over in the course of the winter, scarcely ever do so now. This change has produced an unfortunate fluctuation between heat and cold, in the spring of the year, which is very fatal to fruits. From the year 1741 to 1769, an interval of twenty-eight years, there was no instance of fruit killed by the frost in the neighbourhood of Monticello. An intense cold, produced by constant snows, kept the buds locked up till the sun could obtain, in the spring of the year, so fixed an ascendancy as to dissolve those snows, and protect the buds, during their developement, from every danger of returning cold. The accumulated snows of the winter remaining to be dissolved all together in the spring, produced those overflows of our rivers, so frequent then, and so rare now." (186)

Carl-Gustav Rossby also speculated about Global Warming in a 1956 interview, stating,

"There have been reports that our climate is generally warming up. Some have attributed this to an increase in carbon dioxide, in the atmosphere from man's industrial efforts. Carbon dioxide in the atmosphere may have a greenhouse effect. It may let the sun's rays pass through but keep the heat from radiating back into space. It is true that in recent years certain Arctic areas seem to have less ice. For example, the Arctic coast line of Siberia and Europe is much more navigable." (545)

In 1968, the Stanford Research Institute (SRI) submitted a report to the American Petroleum Institute (API), in the report they warned about the potential of global warming if carbon dioxide emissions were not brought under control, their warnings were ignored. In the report they stated,

"If the earth's temperature increases significantly, a number of events might be expected to occur, including the melting of the Antarctic ice cap, a rise in sea levels, warming of the oceans, and an increase in photosynthesis."

"In summary, Revelle makes the point that man is now engaged in a vast geophysical experiment with his environment, the earth. Significant temperature changes are almost certain to occur by the year 2000 and these could bring about climatic changes."

"It is clear that we are unsure as to what our long-lived pollutants are doing to our environment; however, there seems to be no doubt that the potential damage to our environment could be severe. Whether one chooses the CO₂ warming theory as described in detail by Revelle and others or the newer cooling prospect indicated by McCormick and Ludwig, the prospect for the future must be of serious concern.

It seems ironic that in our view of air pollution technology we take such a serious concern with small-scale events such as the photochemical reactions of trace concentrations of hydrocarbons, the effect on vegetation of a fraction of a part per million of SO₂, when the abundant pollutants which we generally ignore because they have little local effect, CO₂ and submicron particles, may be the cause of serious world-wide environmental changes."

"Past and present studies of CO₂ are detailed and seem to explain adequately the present state of CO₂ in the atmosphere. What is lacking, however, is an application of these atmospheric CO₂ data to air pollution technology and work toward systems in which CO₂ emissions would be brought under control." (158)

Jim Hansen testified before the United States Congress 30 years ago about global warming, his warnings also went virtually unnoticed and were dismissed by many. Today, global warming and many other environmental issues caused by anthropogenic activities have been proven with irrefutable scientific evidence by thousands of leading scientists from around the world. The worldwide scientific consensus on Global Warming is that it is unequivocally happening now, and it is being caused by anthropogenic activities. A global temperature rise, ocean warming, ocean acidification, sea level rise, increased extreme weather events, declining Arctic sea ice,

decreased snow cover, glacial retreat, and shrinking ice sheets have all been scientifically proven and linked to global warming caused by anthropogenic activities. For more than 50 years, these scientists have intensively studied and continue to study global warming, and every national and international scientific body of any standing agree that anthropogenic activities have led to global warming. Since being established in 1988, the thousands of scientists from around the world which make up the Intergovernmental Panel on Climate Change (IPCC) have provided the public and government with a scientific view of global warming and climate change, as well as the reality of its political, social, and economic impacts in the future. In addition, as result of the Global Change Research Act of 1990, a global warming report is presented to the President and Congress of the United States every four years. The scientifically detailed report is entirely focused on the evidence and the consequences of global warming and is compiled by a team of more than 300 experts from: Agency for International Development, United States Department of Agriculture, National Oceanic and Atmospheric Administration, United States Department of Commerce, National Institute of Standards and Technology, United States Department of Defense, United States Department of Energy, National Institutes of Health, United States Department of Health and Human Services, United States Department of State, United States Department of Transportation, United States Geological Survey, United States Department of the Interior, Environmental Protection Agency, National Aeronautics and Space Administration, National Science Foundation, and the Smithsonian Institution. So why then do so many *Homo sapiens*, and more importantly government officials, still disbelieve and deny that global warming is occurring with so many scientists showing them the truth with factual undeniable scientific evidence? Why do some try to justify these issues as good and signs of progress?

Unfortunately, like so many other things *Homo sapiens* choose to deny, erroneous preconceived notions often blind one to obvious and indubitable scientific facts. Some view the scientific evidence presented to them and see in the evidence what they want to see, and not the reality of the facts. Some think that global warming is cyclical or just simply a natural occurring phenomenon and not caused by anthropogenic activities. Many are also uneducated when it comes to science and therefore do not see a difference in weather versus climate. This lack of scientific education, disbelief, and denial stems from several factors, but mainly it is from the mainstream news media and their portrayal of the issue and lack of coverage on environmental issues, combined with corporations from the petroleum and energy sectors practicing disinformation campaigns to confuse and hide the truth and severity of the issue. If the public sought scientific sources for information about scientific issues like global warming, rather than sources with their perhaps biased commercial and political influences, would not more *Homo sapiens* believe the irrefutable scientifically proven based conclusion? Scientist have exhorted about global warming and other environmental issues for many years now, and even with scientific evidence and visual proof there are still many who continue to deny global warming and other environmental issues. In November 1992, there was an appeal issued to all of humanity throughout the world, it was a pleading from more than 1,700 of the world's leading scientists to stop the environmental destruction, and the signatories included the majority of Nobel laureates in the sciences at the time. As their original message was not fully heeded, and the environmental destruction has only continued to exacerbate for 25 more years, the Union of Concerned Scientist reiterated their message in November 2017 with 15,364 scientist signatories from 184 countries. In the 1992 appeal they stated,

"Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about.

Our massive tampering with the world's interdependent web of life—coupled with the environmental damage inflicted by deforestation, species loss, and climate change—could trigger widespread adverse effects, including unpredictable collapses of critical biological systems whose interactions and dynamics we only imperfectly understand.

Uncertainty over the extent of these effects cannot excuse complacency or delay in facing the threats.

The earth is finite. Its ability to absorb wastes and destructive effluent is finite. Its ability to provide food and energy is finite. Its ability to provide for growing numbers of people is finite. And we are fast approaching many of the earth's limits. Current economic practices which damage the environment, in both developed and underdeveloped nations, cannot be continued without the risk that vital global systems will be damaged beyond repair."

"We the undersigned, senior members of the world's scientific community, hereby warn all humanity of what lies ahead. A great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated."

"A new ethic is required—a new attitude towards discharging our responsibility for caring for ourselves and for the earth. We must recognize the earth's limited capacity to provide for us. We must recognize its fragility. We must no longer allow it to be ravaged. This ethic must motivate a great movement, convincing reluctant leaders and reluctant governments and reluctant peoples themselves to effect the needed changes. " (622)

Skeptical politicians seem no different than the zealous religious tyrants of the middle ages who refused to believe science and tried to suppress it. And even today, environmental issues and more especially global warming is still a contentious issue to some politicians and so many misinformed citizens of the most polluting nations of the world, which have in fact caused much of the damage. Why do *Homo sapiens* believe the corporations, news media, and political lies versus the scientific experts with their logical and factual scientific evidence? Al Gore wrote,

"As Joseph Conrad said in *The Heart of Darkness*, "The conquest of the earth is not a pretty thing when you look into it too much." But we are addicted to that conquest, and so we deny it is ugly and destructive. We elaborately justify what we are doing while turning a blind eye to the consequences. We are hostile to the messengers who warn us that we have to change, suspecting them of subversive intent and accusing them of harboring some hidden agenda – Marxism, or statism, or anarchism. ("Killing the messenger," in fact, is a well-established form of denial.)"

"The misconception that there is serious disagreement among scientists about global warming is actually an illusion that has been deliberately fostered by a relatively small but extremely well-funded cadre of special interests, including Exxon Mobil and a few other oil, coal, and utilities companies. These companies want to prevent any new policies that would interfere with their current business plans that reply on the massive unrestrained dumping of global warming pollution into the Earth's atmosphere every hour of every day." (39)

Furthermore, Al Gore states,

"The truth about global warming is especially inconvenient and unwelcome to some powerful people and companies making enormous sums of money from activities they know full well will have to change dramatically in order to ensure the planet's livability.

These people-especially those at a few multinational companies with the most at stake-have been spending many millions of dollars every year in figuring out ways of sowing public confusion about global warming. They've been particularly effective in building a coalition with other groups who agree to support each other's interests, and that coalition has thus far managed to paralyze America's ability to respond to global warming. The Bush/Cheney administration has received strong support from this coalition and seems to be doing everything it can to satisfy their concerns.

For example, many scientists working on global-warming research throughout the government have been ordered to watch what they say about the climate crisis and instructed not to talk to the news media. More important, all of America's policies related to global warming have been changed to reflect the unscientific view-the administration's view-that global warming is not a problem. Our negotiators in international forums dealing with global warming have been advised to try and stop any movement toward action that would inconvenience oil or coal companies, even if this means disruption the diplomatic machinery in order to do it.

In addition, President Bush appointed the person in charge of the oil company disinformation campaign on global warming to head up all environmental policy in the White House. Even though this lawyer/lobbyist had no scientific training whatsoever, he was empowered by the president to edit and censor all warnings from the EPA and other government agencies about global warming." (40)

As early as 1981, ExxonMobil knew about global warming and over the next 27 years they spent millions of dollars promoting a global warming denial campaign. (159) In September 2006, the Royal Society wrote a letter to demand that ExxonMobil stop funding groups that are attempting to undermine scientific consensus on global warming. The Royal Society's survey found that ExxonMobil distributed \$2,900,000 to 39 groups which misrepresent the science on global warming. (78) This misinformation campaign to confuse the public about global warming has worked especially well in the United States. The October 22, 2012 PBS Frontline report, '*Climate of Doubt*', reports on the organizations which are fighting the scientific community over global

warming. And Robert Kenner's 2014 documentary *'Merchants of Doubt'* details how the public relations tactics invented by the tobacco industry to create confusion about smoking related health issues have also been used for other harmful industries, but more especially the fossil fuel industry to cast doubt on the scientific facts about global warming. In 2000 Ross Gelbspan stated,

"Nine years ago, Western Fuels and several coal utilities launched a half-million-dollar public relations campaign which called for local press, radio and TV appearances by Drs. Balling, Michaels and Singer. According to its strategy papers, the purpose of the campaign was to "reposition global warming as theory rather than fact." The same document indicates the campaign was designed to target "older, less-educated men...[and] young, low-income women" in districts which receive their electricity from coal and, preferably, have a representative on the House Energy Committee." (558)

And then in 2015 Eric Roston of Bloomberg reported,

"A loose network of 4,556 individuals with overlapping ties to 164 organizations do the most to dispute climate change in the U.S., according to a paper published today in Nature Climate Change. ExxonMobil and the family foundations controlled by Charles and David Koch emerge as the most significant sources of funding for these skeptics. As a two-week United Nations climate summit begins today in Paris, it's striking to notice that a similarly vast infrastructure of denial isn't found in any other nation." (453)

In addition, an August 2017 analysis of recently made available communications about global warming by ExxonMobil between 1977 and 2014 concluded,

"This paper assesses whether ExxonMobil Corporation has in the past misled the general public about climate change. We present an empirical document-by-document textual content analysis and comparison of 187 climate change communications from ExxonMobil, including peer-reviewed and non-peer-reviewed publications, internal company documents, and paid, editorial-style advertisements ('advertorials') in The New York Times. We examine whether these communications sent consistent messages about the state of climate science and its implications—specifically, we compare their positions on climate change as real, human-caused, serious, and solvable. In all four cases, we find that as documents become more publicly accessible, they increasingly communicate doubt. This discrepancy is most pronounced between advertorials and all other documents. For example, accounting for expressions of reasonable doubt, 83% of peer-reviewed papers and 80% of internal documents acknowledge that climate change is real and human-caused, yet only 12% of advertorials do so, with 81% instead expressing doubt. We conclude that ExxonMobil contributed to advancing climate science—by way of its scientists' academic publications—but promoted doubt about it in advertorials. Given this discrepancy, we conclude that ExxonMobil misled the public. Our content analysis also examines ExxonMobil's discussion of the risks of stranded fossil fuel assets. We find the topic discussed and sometimes quantified in 24 documents of various types, but absent from advertorials." (516)

Some think there is nothing to worry about that technology will fix everything and that adaptation is the solution. Others have the erroneous notion that Earth itself is too big and it is invincible, that anything *Homo sapiens* do will have no real effect on Earth itself. Others simply do not care or think it is too late to change or do anything, they have a '*society is doomed anyway mentality*'. Global warming has even been justified as a necessary side-effect of progress and that there is no other way to maintain current civilization. Instead of trying to mitigate or adapt to global warming, which could ultimately have devastating global consequences, would not the easier solution be to simply stop doing what is causing global warming and other environmental issues? Why can't *Homo sapiens* not see what their lifestyles are doing to Earth and the other inhabitants of the planet? It is almost as if some *Homo sapiens* are so brainwashed into their train of thought, or so absorbed with their lifestyle that they have completely ignored the reality of what is going on around them. So long as the problem does not affect one directly or one does not see the reality in front of them, the issues are out of sight and thus out of mind, and they are not concerned with it. Ignoring reality, the world which surrounds you, and the problems that need to be addressed is no solution to any problem, it only contributes to the problems faced by society as a whole. To look away and say I didn't do that it's not my fault, so why should I be burdened with it, is nothing more than an act of selfishness and irresponsibility.

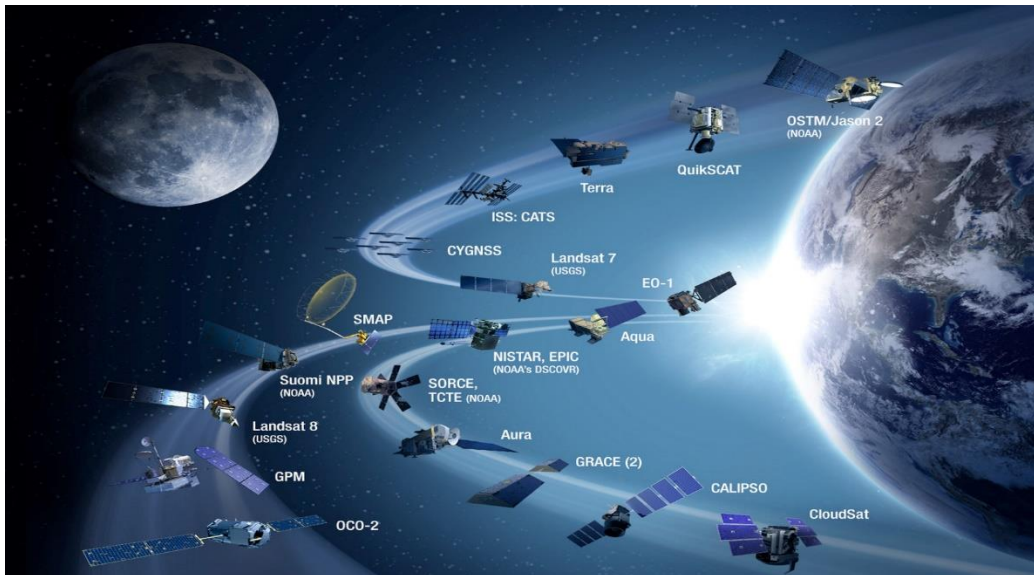
Scientific Evidence

Irrefutable scientific evidence, such as sea level rise, global temperature rise, glacial retreat, warming oceans, shrinking ice sheets, declining Arctic sea ice, ocean acidification, extreme weather, and decreased snow cover has proven without a doubt that global warming is happening, and censoring '*evidence-based*' and '*climate change*' from government websites in an attempt to silence scientists will not change the scientific facts. A 1969

tobacco industry document stated,

"Doubt is our product since it is the best means of competing with the "body of fact" that exists in the mind of the general public. It is also the means of establishing a controversy." (452)

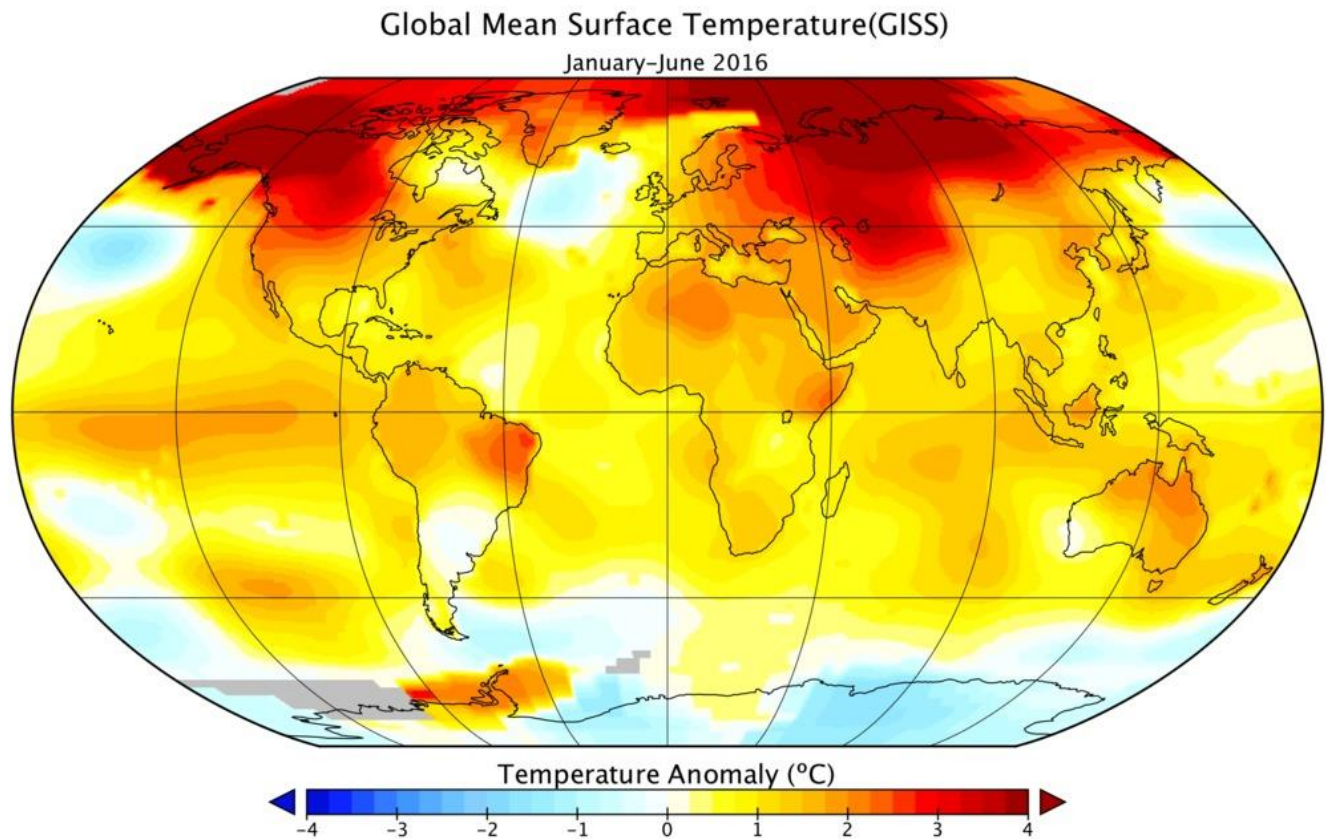
This is the same strategy of denial some corporations use today in their attempts to thwart change and continue depredating the Earth for as long as possible. If *Homo sapiens* were more scientifically educated, would such attempts to spread doubt even be possible? How can anyone doubt NASA and the evidence they have presented regarding global warming and other environmental issues, while at the same time having such pride and confidence in this organization and the scientists who make it up when it comes to landing on the Moon or other space exploration? With current technologies, scientists can monitor the atmosphere and other environmental aspects of Earth from satellites and terrestrial stations and they are alerted to any fluctuations that occur. With the help of these satellites monitoring the Earth, there is now the most accurate scientific data about Earth ever gathered. These satellites have been producing data showing further undeniable evidence of global warming, deforestation, pollution, and other environmental impacts *Homo sapiens* are having on Earth. Will this scientific evidence ever help to change the delusional perspective and opinions of those who deny global warming and other environmental issues? Perhaps they would be convinced, and this ignorance would be eliminated if these deniers watched the 12 episodes of 'Earth Rock' in the 'Schoolhouse Rock!' series which explains environmental issues so simplistically that even children can understand it.



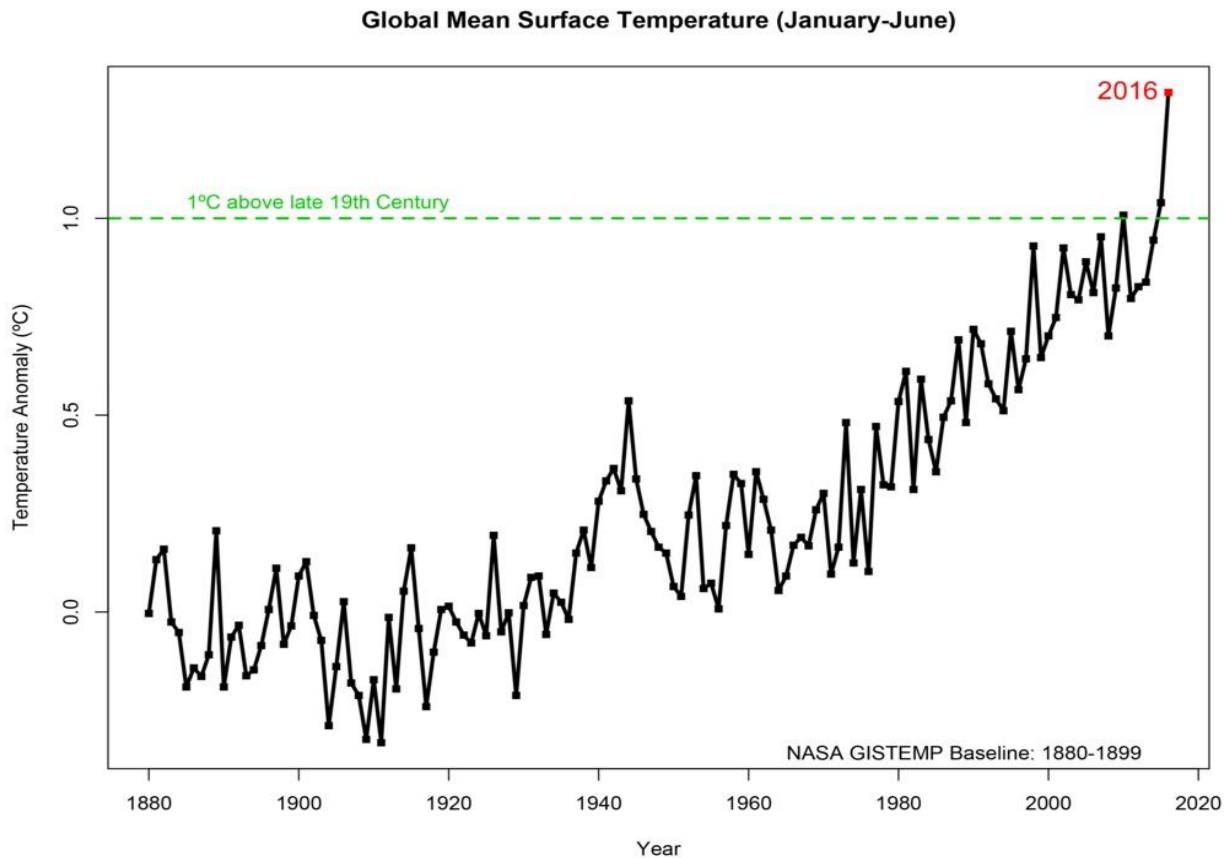
SOURCE: NASA – Currently NASA maintains a fleet of Earth science spacecraft and instruments in orbit studying all aspects of the Earth system (oceans, land, atmosphere, biosphere, cryosphere), with more planned for launch in the next few years.

Some of the Current Satellite Missions Which Monitor the Environment of Earth		
Satellite	Launch Date	Mission
TERRA	1999	Monitors land, ocean, and atmosphere interactions with an emphasis on land
AQUA	2002	Monitors land, ocean, and atmosphere interactions with an emphasis on hydrological cycle
GRACE	2002	Two satellites monitoring the gravity field for global groundwater and ice changes
SORCE	2003	Monitors solar radiation
AURA	2004	Monitors the ozone layer
OSTM	2008	Monitors ocean sea level fluctuations
LANDSAT 8	2013	Monitors the amount of land being use
OCO-2	2014	Monitors global carbon dioxide levels taking more than 100,000 measurements each day

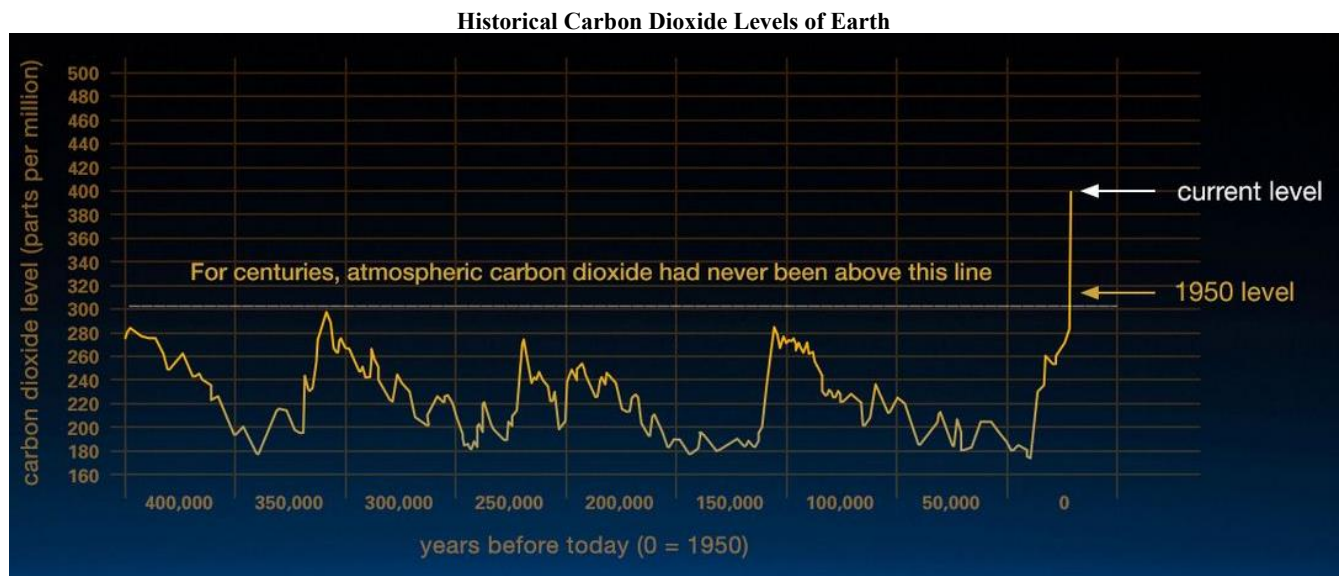
		of carbon dioxide in the atmosphere.
GPM CORE	2014	Monitors rain and snow activity
SMAP	2015	Monitors global soil moisture
SENTINEL-5	2017	Monitors O ₃ , NO ₂ , SO ₂ , HCHO, CHOCHO, aerosols, CO, CH ₄ , and stratospheric O ₃ with daily global coverage for climate, air quality, and ozone/surface UV applications.
SOURCE: NASA and ESA		



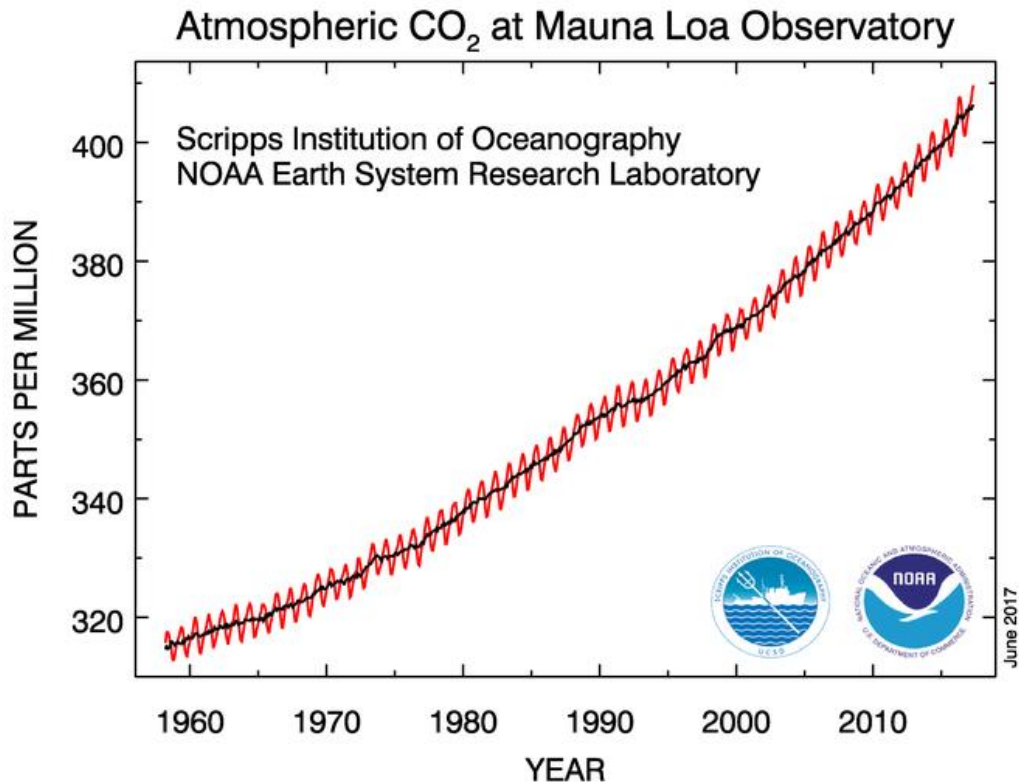
SOURCE: NASA/GISS This color-coded map in Robinson projection displays global surface temperature anomalies for the period January 2016 through June 2016. Higher than normal temperatures are shown in red and lower than normal temperatures are shown in blue.



SOURCE: NASA/GISS A graph of the global mean surface temperature for the six-month period of January through June of each year from 1880-2016. The numbers are the differences from the pre-industrial era, calculated as the average mean surface temperature of 1880-1899. Credit: NASA/GISS

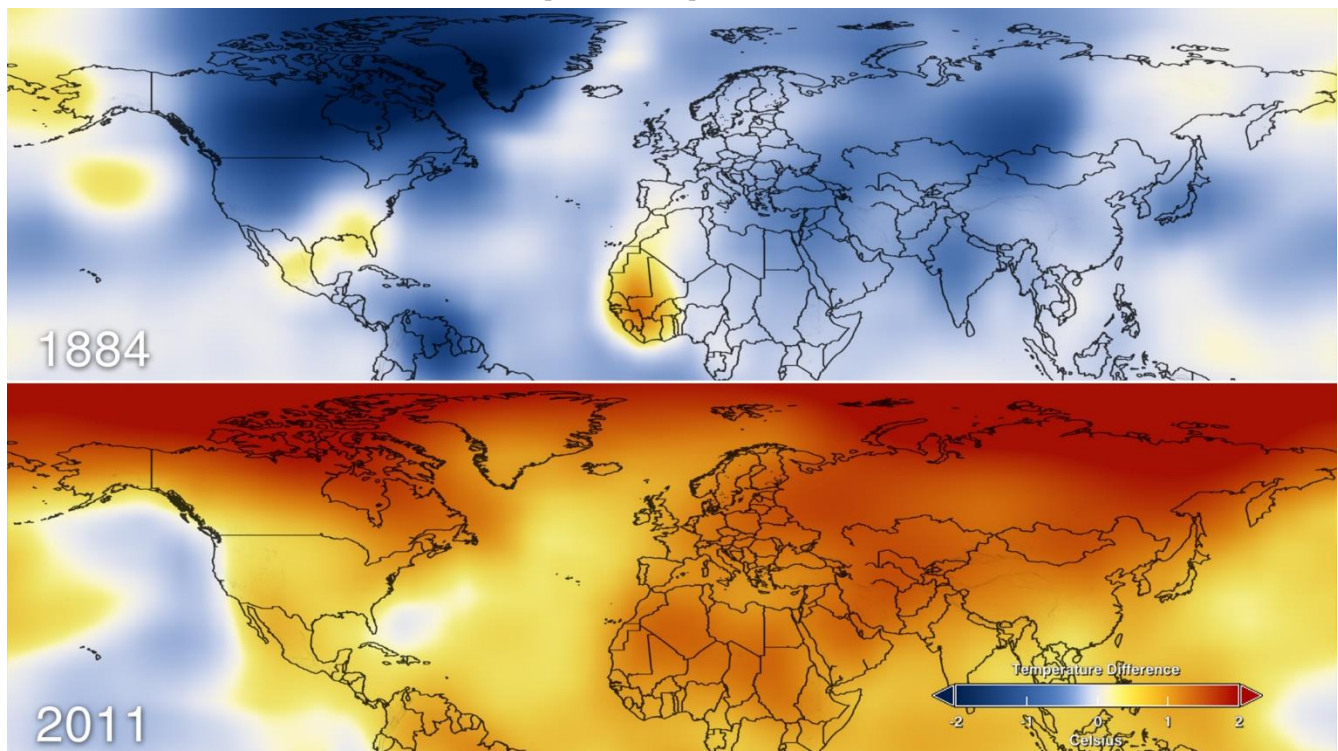


SOURCE: NASA (Credit: Vostok ice core data/J.R. Petit et al.; NOAA Mauna Loa CO₂ record.) This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO₂ has increased since the Industrial Revolution. In 2017 the Carbon Dioxide level in the air was 406.69 parts per million, the highest it has been in 650,000 years.



Source: NOAA - The carbon dioxide data (red curve), measured as the mole fraction in dry air, on Mauna Loa constitute the longest record of direct measurements of CO₂ in the atmosphere. They were started by C. David Keeling of the Scripps Institution of Oceanography in March of 1958 at a facility of the National Oceanic and Atmospheric Administration.

Global Temperature Comparison 1884 and 2011



SOURCE: NASA - Temperature Rising – Visualization by Lori Perkins - February 2, 2012 - <https://svs.gsfc.nasa.gov/10901>

U.S. Environmental Protection Agency (EPA)
37 Climate Change Indicators in the United States for 2016

U.S. Greenhouse Gas Emissions - In the United States, greenhouse gas emissions caused by human activities increased by 7 percent from 1990 to 2014. Since 2005, however, total U.S. greenhouse gas emissions have decreased by 7 percent. Electricity generation is the largest source of greenhouse gas emissions in the United States, followed by transportation.

Global Greenhouse Gas Emissions - Worldwide, net emissions of greenhouse gases from human activities increased by 35 percent from 1990 to 2010. Emissions of carbon dioxide, which account for about three-fourths of total emissions, increased by 42 percent over this period.

Atmospheric Concentrations of Greenhouse Gases - Concentrations of carbon dioxide and other greenhouse gases in the atmosphere have increased since the beginning of the industrial era. Almost all of this increase is attributable to human activities.¹ Historical measurements show that the current global atmospheric concentrations of carbon dioxide are unprecedented compared with the past 800,000 years, even after accounting for natural fluctuations.

Climate Forcing - Climate forcing refers to a change in the Earth's energy balance, leading to either a warming or cooling effect over time. An increase in the atmospheric concentrations of greenhouse gases produces a positive climate forcing, or warming effect. From 1990 to 2015, the total warming effect from greenhouse gases added by humans to the Earth's atmosphere increased by 37 percent. The warming effect associated with carbon dioxide alone increased by 30 percent.

U.S. and Global Temperature - Average temperatures have risen across the contiguous 48 states since 1901. Average global temperatures show a similar trend, and all of the top 10 warmest years on record worldwide have occurred since 1998. Within the United States, temperatures in parts of the North, the West, and Alaska have increased the most.

High and Low Temperatures - Nationwide, unusually hot summer days (highs) have become more common over the last few decades. Unusually hot summer nights (lows) have become more common at an even faster rate. This trend indicates less "cooling off" at night. Although the United States has experienced many winters with unusually low temperatures, unusually cold winter temperatures have become less common—particularly very cold nights (lows).

U.S. and Global Precipitation - Total annual precipitation has increased over land areas in the United States and worldwide. Since 1901, precipitation has increased at an average rate of 0.08 inches per decade over land areas worldwide. However, shifting weather patterns have caused certain areas, such as the Southwest, to experience less precipitation than usual.

Heavy Precipitation - In recent years, a higher percentage of precipitation in the United States has come in the form of intense single-day events. The prevalence of extreme single-day precipitation events remained fairly steady between 1910 and the 1980s but has risen substantially since then. Nationwide, nine of the top 10 years for extreme one-day precipitation events have occurred since 1990.

Tropical Cyclone Activity - Tropical storm activity in the Atlantic Ocean, the Caribbean, and the Gulf of Mexico has increased during the past 20 years. Storm intensity is closely related to variations in sea surface temperature in the tropical Atlantic. However, changes in observation methods over time make it difficult to know for sure whether a longer-term increase in storm activity has occurred.

River Flooding - Increases and decreases in the frequency and magnitude of river flood events vary by region. Floods have generally become larger across parts of the Northeast and Midwest and smaller in the West, southern Appalachia, and northern Michigan. Large floods have become more frequent across the Northeast, Pacific Northwest, and parts of the northern Great Plains, and less frequent in the Southwest and the Rockies.

Drought - Over the period from 2000 through 2015, roughly 20 to 70 percent of the U.S. land area experienced conditions that were at least abnormally dry at any given time. However, this index has not been in use for long enough to compare with historical drought patterns.

Ocean Heat - Three independent analyses show that the amount of heat stored in the ocean has increased substantially since the 1950s. Ocean heat content not only determines sea surface temperature, but also affects sea level and currents.

Sea Surface Temperature - Ocean surface temperatures increased around the world during the 20th century. Even with some year-to-year variation, the overall increase is clear, and sea surface temperatures have been consistently higher during the past three decades than at any other time since reliable observations began in the late 1800s.

Sea Level - When averaged over all of the world's oceans, sea level has risen at a rate of roughly six-tenths of an inch per decade since 1880. The rate of increase has accelerated in recent years to more than an inch per decade. Changes in sea level relative to the land vary by region. Along the U.S. coastline, sea level has risen the most along the Mid-Atlantic coast and parts of the Gulf coast, where some stations registered increases of more than 8 inches between 1960 and 2015. Sea level has decreased relative to the land in parts of Alaska and the Pacific Northwest.

Coastal Flooding - Flooding is becoming more frequent along the U.S. coastline as sea level rises. Nearly every site measured has experienced an increase in coastal flooding since the 1950s. The rate is accelerating in many locations along the East and Gulf coasts. The Mid-Atlantic region suffers the highest number of coastal flood days and has also experienced the largest increases in flooding.

Ocean Acidity - The ocean has become more acidic over the past few decades because of increased levels of atmospheric carbon dioxide, which dissolves in the water. Higher acidity affects the balance of minerals in the water, which can make it more difficult for certain marine animals to build their protective skeletons or shells.

Arctic Sea Ice - Part of the Arctic Ocean is covered by ice year-round. The area covered by ice is typically smallest in September, after the summer melting season. The annual minimum extent of Arctic sea ice has decreased over time, and in September 2012 it was the smallest ever recorded. The length of the melt season for Arctic ice has grown, and the ice has also become thinner, which makes it more vulnerable to further melting.

Antarctic Sea Ice - Antarctic sea ice extent in September and February has increased somewhat over time. The September maximum extent reached the highest level on record in 2014—about 7 percent larger than the 1981–2010 average. Slight increases in Antarctic sea ice are outweighed by the loss of sea ice in the Arctic during the same time period, however.

Glaciers - Glaciers in the United States and around the world have generally shrunk since the 1960s, and the rate at which glaciers are melting has accelerated over the last decade. The loss of ice from glaciers has contributed to the observed rise in sea level.

Lake Ice - Lakes in the northern United States are thawing earlier in spring compared with the early 1900s. All 14 lakes studied were found to be thawing earlier in the year, with thaw dates shifting earlier by up to 24 days over the past 110 years.
Snowfall - Total snowfall—the amount of snow that falls in a particular location—has decreased in most parts of the country since widespread records began in 1930. One reason for this decline is that nearly 80 percent of the locations studied have seen more winter precipitation fall in the form of rain instead of snow.
Snow Cover - Snow cover refers to the area of land that is covered by snow at any given time. Between 1972 and 2015, the average portion of North America covered by snow decreased at a rate of about 3,300 square miles per year, based on weekly measurements taken throughout the year. There has been much year-to-year variability, however. The length of time when snow covers the ground has become shorter by nearly two weeks since 1972, on average.
Snowpack - The depth of snow on the ground (snowpack) in early spring decreased at more than 90 percent of measurement sites in the western United States between 1955 and 2016. Across all sites, snowpack depth declined by an average of 23 percent during this time period.
Heat-Related Deaths - Since 1979, more than 9,000 Americans were reported to have died as a direct result of heat-related illnesses such as heat stroke. The annual death rate is higher when accounting for deaths in which heat was reported as a contributing factor, including the interaction of heat and cardiovascular disease. People aged 65+ are a particular concern: a growing demographic group that is several times more likely to die from heat-related cardiovascular disease than the general population. Considerable year-to-year variability and certain limitations of the underlying data for this indicator make it difficult to determine whether the United States has experienced long-term trends in the number of deaths classified as “heat-related.”
Heat-Related Illnesses - From 2001 to 2010, a total of about 28,000 heat-related hospitalizations were recorded across 20 states. Annual heat-related hospitalization rates ranged from fewer than one case per 100,000 people in some states to nearly four cases per 100,000 in others. People aged 65+ accounted for more heat-related hospitalizations than any other age group from 2001 to 2010, and males were hospitalized for heat-related illnesses more than twice as often as females.
Heating and Cooling Degree Days - Heating and cooling degree days measure the difference between outdoor temperatures and the temperatures that people find comfortable indoors. As the U.S. climate has warmed in recent years, heating degree days have decreased and cooling degree days have increased overall, suggesting that Americans need to use less energy for heating and more energy for air conditioning.
Lyme Disease - Lyme disease is a bacterial illness spread by ticks that bite humans. Tick habitat and populations are influenced by many factors, including climate. Nationwide, the rate of reported cases of Lyme disease has approximately doubled since 1991. The number and distribution of reported cases of Lyme disease have increased in the Northeast and upper Midwest over time, driven by multiple factors.
West Nile Virus - West Nile virus is spread by mosquitoes, whose habitat and populations are influenced by temperature and water availability. The incidence of West Nile virus neuroinvasive disease in the United States has varied widely from year to year and among geographic regions since tracking began in 2002. Variation in disease incidence is affected by climate and many other factors, and no obvious long-term trend can be detected yet through this limited data set.
Length of Growing Season - The length of the growing season for crops has increased in almost every state. States in the Southwest (e.g., Arizona and California) have seen the most dramatic increase. In contrast, the growing season has actually become shorter in a few southeastern states. The observed changes reflect earlier spring warming as well as later arrival of fall frosts.
Ragweed Pollen Season - Warmer temperatures and later fall frosts allow ragweed plants to produce pollen later into the year, potentially prolonging the allergy season for millions of people. The length of ragweed pollen season has increased at 10 out of 11 locations studied in the central United States and Canada since 1995. The change becomes more pronounced from south to north.
Wildfires - Of the 10 years with the largest acreage burned since 1983, nine have occurred since 2000. Fires burn more land in the western United States than in the East.
Streamflow - Changes in temperature, precipitation, snowpack, and glaciers can affect the rate of streamflow and the timing of peak flow. Over the last 75 years, minimum, maximum, and average flows have changed in many parts of the country—some higher, some lower. Most of the rivers and streams measured show peak winter-spring runoff happening at least five days earlier than it did in the mid-20th century.
Stream Temperature - Stream temperatures have risen throughout the Chesapeake Bay region—the area of focus for this indicator. From 1960 through 2014, water temperature increased at 79 percent of the stream sites measured in the region. Temperature has risen by an average of 1.2°F across all sites and 2.2°F at the sites where trends were statistically significant.
Great Lakes Water Levels - Water levels in most of the Great Lakes appear to have declined in the last few decades. However, the most recent levels are all within the range of historical variation. Water levels in lakes are influenced by water temperature, which affects evaporation rates and ice formation.
Bird Wintering Ranges - Some birds shift their range or alter their migration habits to adapt to changes in temperature or other environmental conditions. Long-term studies have found that bird species in North America have shifted their wintering grounds northward by an average of more than 40 miles since 1966, with several species shifting by hundreds of miles.
Marine Species Distribution - The average center of biomass for 105 marine fish and invertebrate species along U.S. coasts shifted northward by about 10 miles between 1982 and 2015. These species also moved an average of 20 feet deeper. Shifts have occurred among several economically important fish and shellfish species. For example, American lobster, black sea bass, and red hake in the Northeast have moved northward by an average of 119 miles.
Leaf and Bloom Dates - Leaf growth and flower blooms are examples of natural events whose timing can be influenced by climate change. Observations of lilacs and honeysuckles in the contiguous 48 states suggest that first leaf dates and bloom dates show a great deal of year-to-year variability.
SOURCE: U.S. Environmental Protection Agency (EPA) – Climate Change Indicators in the United States 2016 - EPA 430-R-16-004 - https://www.epa.gov/sites/production/files/2016-08/documents/climate_indicators_2016.pdf

Carbon dioxide, methane, and nitrous oxide have all increased to levels not seen on Earth in at least the last 800,000 years. In 2011, the concentrations were: carbon dioxide 391 ppm, methane 1803 ppb, and nitrous oxide 324 ppb, and have exceeded the pre-industrial levels by about: carbon dioxide 40%, methane 150%, and nitrous oxide 20%. (268) Methane, one of the most potent greenhouse gases which traps 28 times more heat per mass unit than carbon dioxide and also affects the degradation of the ozone layer, was once thought to have only recently increased in the atmosphere beginning with the industrial revolution around 270 years ago. But a 2012 study of Greenland ice core data found that around 2,100 years ago until around 400 years ago methane emissions rose by nearly 31,000,000 tons per year. This rise correlated with the Roman Empire keeping livestock which produce methane gas and the Han dynasty expanding rice fields that harbor methane-producing bacteria, as well as with the population expansion during the medieval period. In addition, all of these empires and kingdoms also engaged in large scale metallurgy which further helped to produce even more methane emissions. Further correlation could be seen in that after the Roman Empire and the Han dynasty civilizations declined methane emissions briefly decreased. (246) Did Global Warming truly begin thousands of years ago with the rapid increase of world population which resulted in more fires burning for warmth and cooking in addition to increased metallurgy, livestock, and large-scale agriculture?

Ocean Warming

The oceans have been warming rapidly because they have absorbed more than 93% of the enhanced heating since the 1970s. An often-overlooked fact, is that the oceans store vast quantities of frozen methane. What will happen to the Earth's oceans and atmosphere if this methane is released due to warming oceans? What will happen if the oceans reach a thermal maximum or maximum absorption, would the atmospheric temperature rise rapidly causing an abrupt and devastating temperature rise? What will a warmer ocean be like, how many species will go extinct because of the rapid rise in ocean temperatures? Will the trapped heat in the oceans be slowly or rapidly released in the future, and what effect with this ultimately have on global temperatures and weather? Could warmer oceans produce 'super tropical cyclones' and other extreme weather? A 2016 IUCN report on ocean warming stated,

"Ocean warming is a complex issue that we are still striving to fully understand. Given the magnitude of the heat stored in the ocean, its interactions and feedbacks with the carbon and water budgets and key role in the Earth's energy budget future research to understand the processes involved should have a very high priority...Funding of ocean science has been a low priority in the past and governments have a long record of cutting long term observations. There is a real danger that the number of Argo floats in the ocean, that have been largely instrumental in providing us with the data that have led to our current knowledge of ocean warming, are in danger of being reduced due to policy bias and/or budgetary cuts by governments.

Currently 2.5 Gt of frozen methane hydrate are stored in the sea floor at water depths of 200 – 2000 m. Increasing water temperature could release this source of carbon into the ocean and ultimately into the atmosphere.

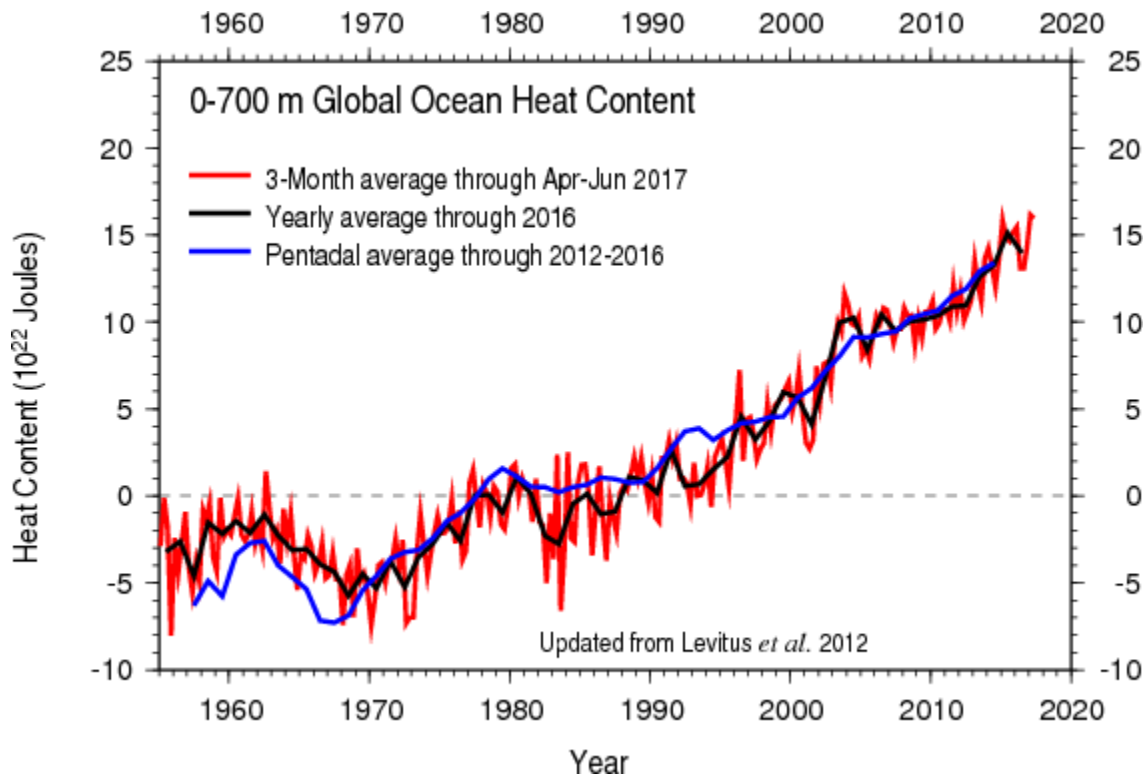
Crucially, as evident in the past two years, the heat and CO₂ accumulated in the ocean are not permanently locked away, but can be released back to the atmosphere when the ocean surface is anomalously warm, giving a positive rapid feed-back to global warming.

By absorbing a disproportionate amount of heat from global warming and by taking up the rapidly increasing emissions of carbon dioxide, the ocean has shielded the world from even more rapid changes in climate. How long can it maintain this role?

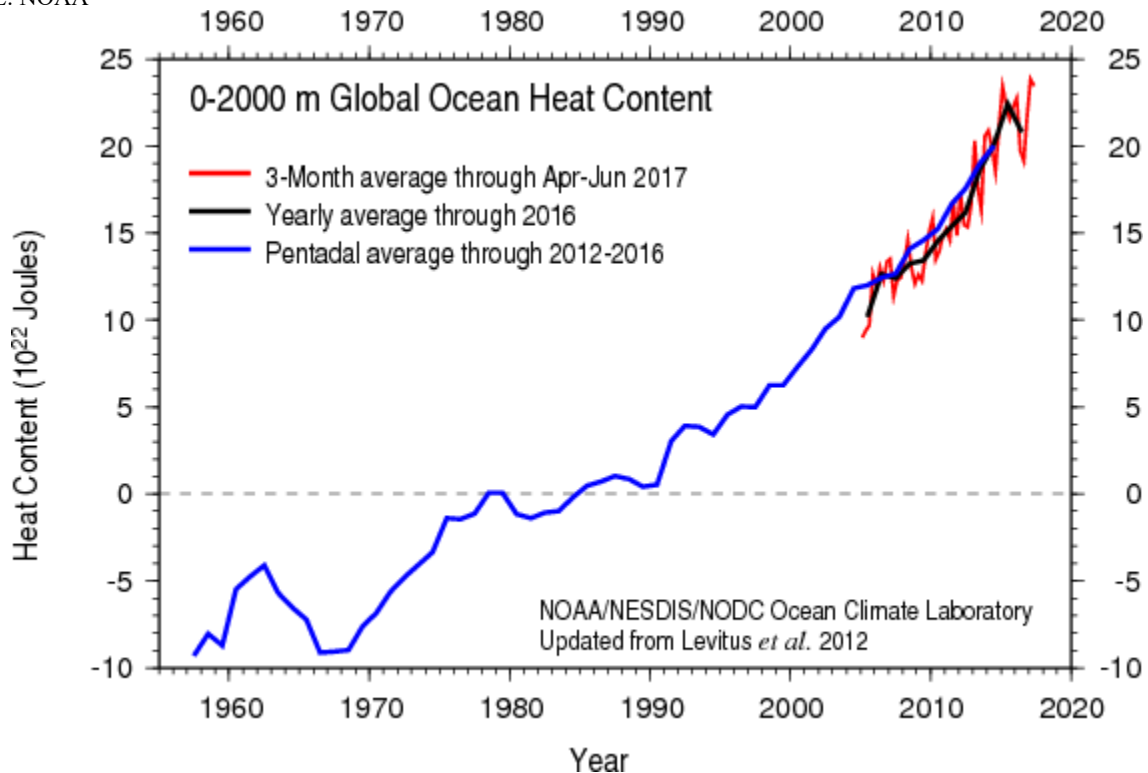
More than 93% of the enhanced heating since the 1970s due to the greenhouse effect and other human activities has been absorbed by the ocean, and data show a sustained and accelerating upward trend in ocean warming. 2015 was recently analysed to have been the warmest year within the 136-year of extended reconstructed sea surface temperature records, and the fourth such record-breaking year since 2005.

...Analysis of ocean heat content estimates that approximately two thirds of the excess heat thus far absorbed by the ocean has been taken up by the upper ocean in the surface to 700m depth layer with one third absorbed into the deep ocean below 700m depth. By absorbing a disproportionate amount of heat from global warming and by taking up the rapidly increasing emissions of carbon dioxide, the ocean has shielded the world from even more rapid changes in climate. Carbon dioxide – one of the main greenhouse gases, the root cause of ocean warming – is also causing ocean acidification. As Chapter 4 shows, temperature, ocean acidification and deoxygenation, which together are driving responses in species and ecosystems, are

having an impact on the benefits derived from the ocean in the form of ‘goods and services’. As many authors have commented, the scale, nature and problems associated with ocean warming are progressive and based on our current understanding getting worse. The rates of increase in both temperature and CO₂ are of grave concern and emphasize the urgent need to stem further warming by dramatically reducing CO₂ emissions from our activities." (552)



SOURCE: NOAA

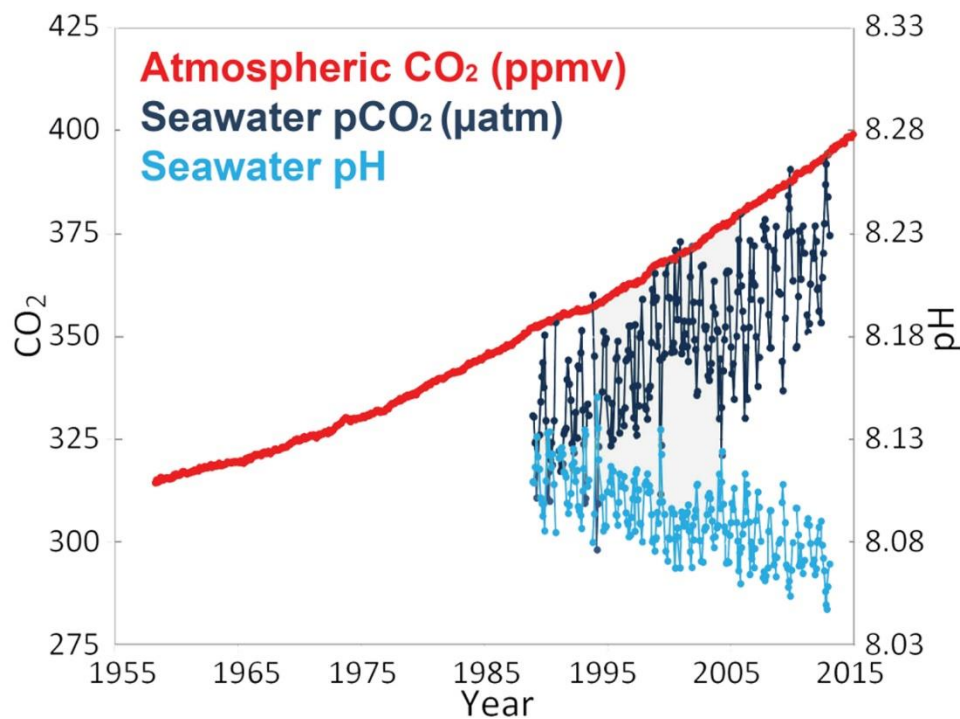


SOURCE: NOAA

Ocean and Freshwater Acidification

For hundreds of thousands of years ocean pH levels have been fairly constant, then when the industrial revolution began around 250 years ago there was a drastic decrease in pH levels resulting from increased carbon dioxide levels. A large portion of the excess carbon dioxide caused by anthropogenic activities is absorbed by the oceans, rivers, and lakes and has resulted in the acidification of the water. Dissolving carbon dioxide in the oceans increases hydrogen ultimately resulting in a lower pH. Pre-industrial ocean pH levels were 8.179, and in 2017 ocean pH levels were 8.069 a 30% increase of hydrogen. This acidification has begun to cause severe stress for many aquatic flora and fauna species in all ocean and freshwater ecosystem worldwide. Although lacking data evidence, as freshwater acidification has been researched far less than ocean acidification, the current scientific consensus is that anthropogenic CO_2 is also affect freshwater carbon hydrogeochemistry and is also causing increased pCO_2 in freshwater bodies as well. And a recent study which analyzed data over a 35-year period has indicated that freshwaters may actually acidify at a faster rate than the oceans. (680) At the Third Symposium on the '*Ocean in a High- CO_2 World*' experts explained,

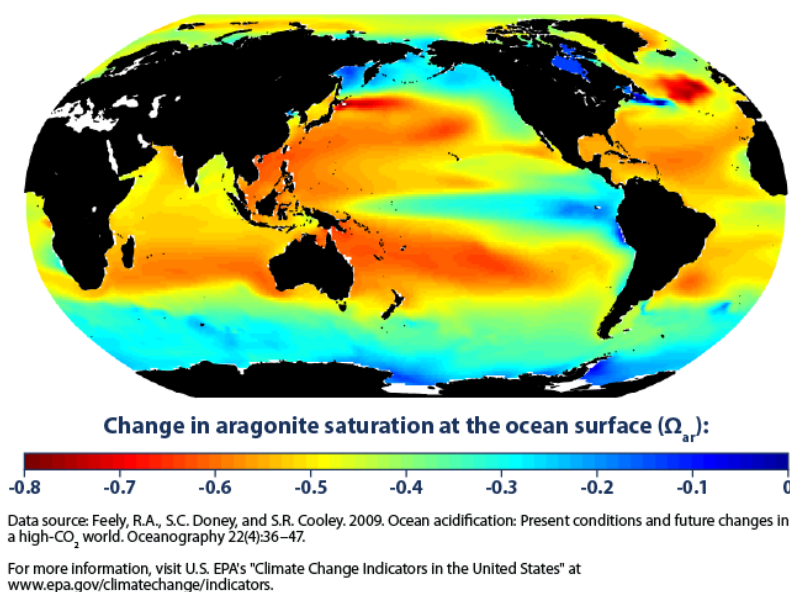
"Species-specific impacts of ocean acidification have been seen in laboratory and field studies on organisms from the poles to the tropics. Many organisms show adverse effects, such as reduced ability to form and maintain shells and skeletons, as well as reduced survival, growth, abundance and larval development. Conversely, evidence indicates that some organisms tolerate ocean acidification and that others, such as some seagrasses, may even thrive. Within decades, large parts of the polar oceans will become corrosive to the unprotected shells of calcareous marine organisms. Changes in carbonate chemistry of the tropical ocean may hamper or prevent coral reef growth within decades. The far-reaching effects of ocean acidification are predicted to impact food webs, biodiversity, aquaculture and hence societies. Species differ in their potential to adapt to new environments. Ocean chemistry may be changing too rapidly for many species or populations to adapt through evolution. Multiple stressors – ocean acidification, warming, decreases in oceanic oxygen concentrations (deoxygenation), increasing UV-B irradiance due to stratospheric ozone depletion, overfishing, pollution and eutrophication – and their interactions are creating significant challenges for ocean ecosystems." (247)



Time series of carbon dioxide and ocean pH
at Mauna Loa, Hawaii

SOURCE: National Oceanic and Atmospheric Administration (NOAA)

Changes in Aragonite Saturation of the World's Oceans, 1880–2012



SOURCE: EPA - This map shows changes in the aragonite saturation level of ocean surface waters between the 1880s and the most recent decade (2006–2015). Aragonite is a form of calcium carbonate that many marine animals use to build their skeletons and shells. The lower the saturation level, the more difficult it is for organisms to build and maintain their skeletons and shells. A negative change represents a decrease in saturation. - <https://www.epa.gov/climate-indicators/climate-change-indicators-ocean-acidity>

Cryosphere Changes - Melting Glaciers, Permafrost, Snow, and Ice Melt

If all the ice on Earth were to melt, sea levels would rise by 216 feet changing the landscape and coastlines of Earth dramatically. (393) NASA reported in June 2018 that sea levels were rising faster today than at any other time in the past 25 years. (335) Over the last 25 years the rate of sea level rise has increased from about 2.5 millimeters per year to about 3.4 millimeters per year. (699) And while this may not sound like much, if this observed pace continues it will cause significant problems for most coastal cities around the world by 2100. The 2016 NOAA Arctic Report Card stated,

"Arctic air temperatures continue to increase at double the rate of the global temperature increase. The average annual surface air temperature anomaly (+2.0° C relative to the 1981-2010 baseline) over land north of 60° N between October 2015 and September 2016 was by far the highest in the observational record beginning in 1900."

"As the sea ice retreats more extensively in the summer, previously ice-covered water is exposed to more solar radiation. As a result, sea surface temperature (SST) and upper ocean temperatures are increasing throughout much of the Arctic Ocean and adjacent seas"

"The Arctic Ocean is especially prone to ocean acidification, due to water temperatures that are colder than those further south. The short Arctic food chain leaves Arctic marine ecosystems vulnerable to ocean acidification events."

"Ice on land, as represented by the Greenland Ice Sheet, saw a continuation of the overall increasing melting trend in 2016, with enhanced melt occurring in the southwest and northeast regions. The onset of surface melt ranked 2nd (after only 2012) over the 37-year period of satellite record (1979 - 2016). The duration of the melt season lasted 30-40 days longer than usual in the northeast and 15-20 days longer along the west coast, compared to the 1981-2010 average."

"Warming air temperatures in the Arctic are causing normally frozen ground (permafrost) to thaw. The permafrost is carbon rich and, when it thaws, is a source of the greenhouse gases carbon dioxide and methane. Northern permafrost zone soils contain 1330-1580 billion tons organic carbon, about twice as much as currently contained in the atmosphere. Tundra ecosystems are taking up increasingly more carbon during the growing season over the past several decades, but this has been offset by increasing carbon loss during the winter. Overall, tundra appears to be releasing net carbon to the atmosphere." (281)



SOURCE: NASA

If the glaciers, permafrost, sea ice, and polar ice caps have absorbed some of the heat energy caused by anthropogenic activities, what will happen when there is no more of it left to absorb this excess heat energy? Will the greening of the tundra absorb enough carbon to balance the release of carbon from the melting permafrost? If the northern permafrost soil zones contain nearly twice the amount of carbon that is currently in the atmosphere, in addition to vast amounts of methane and mercury, what will happen when it is all released into the atmosphere and oceans if the permafrost thaws from global warming? Could this release of stored carbon and methane result in an abrupt runaway temperature increase where areas of Earth experience 150 °F temperatures or perhaps even higher creating areas nearly devoid of most forms life? If glaciers, sea ice, and snow cover continue to retreat, will they at some point become a dormant climatic feature of Earth, waiting to return when ideal climatic conditions return?



SOURCE: USGS – Boulder Glacier Terminus, Glacier National Park, Montana - In the past 100 years, Boulder Glacier has been reduced to a small sliver of ice in the shadow of Boulder Peak. At the former terminus, small trees and other vegetation have become established where once there was only rock and ice. Top image taken in 1913, bottom image taken in 2012.

https://www.usgs.gov/centers/norock/science/boulder-glacier-terminus-1913-2012?qt-science_center_objects=0#qt-science_center_objects



Jackson Glacier, 1911
Morton Elrod photo, K. Ross Toole Archives, U of M



Jackson Glacier, 2009
Lisa McKeon photo, USGS

SOURCE: USGS - Jackson Glacier Terminus, Glacier National Park, Montana - At the time this historic photograph was taken in 1911, Blackfoot Glacier encompassed the current Jackson Glacier. By 1939, Blackfoot Glacier's recession had resulted in two distinct glaciers, Jackson and Blackfoot. This photo pair shows glacial recession and successive vegetation growth along Jackson Glacier's terminus. Top image taken in 1911, bottom image taken in 2009. https://www.usgs.gov/centers/norock/science/jackson-glacier?qt-science_center_objects=0#qt-science_center_objects



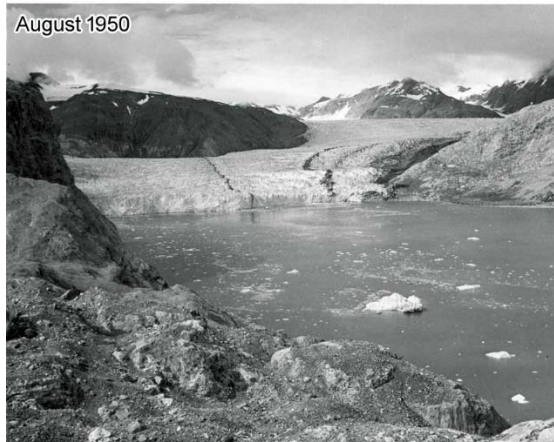
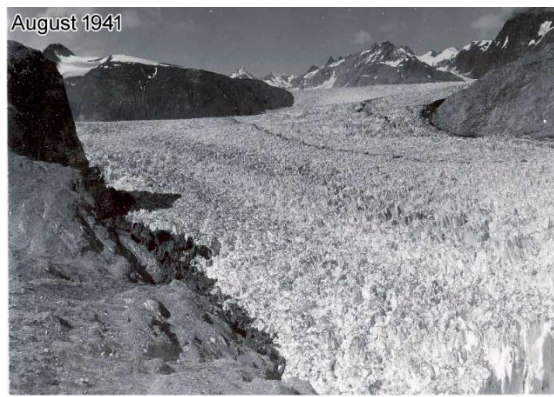
*Sperry Glacier - NE view, Aug. 13, 1913
photo by W. C. Alden, courtesy of GNP Archives*



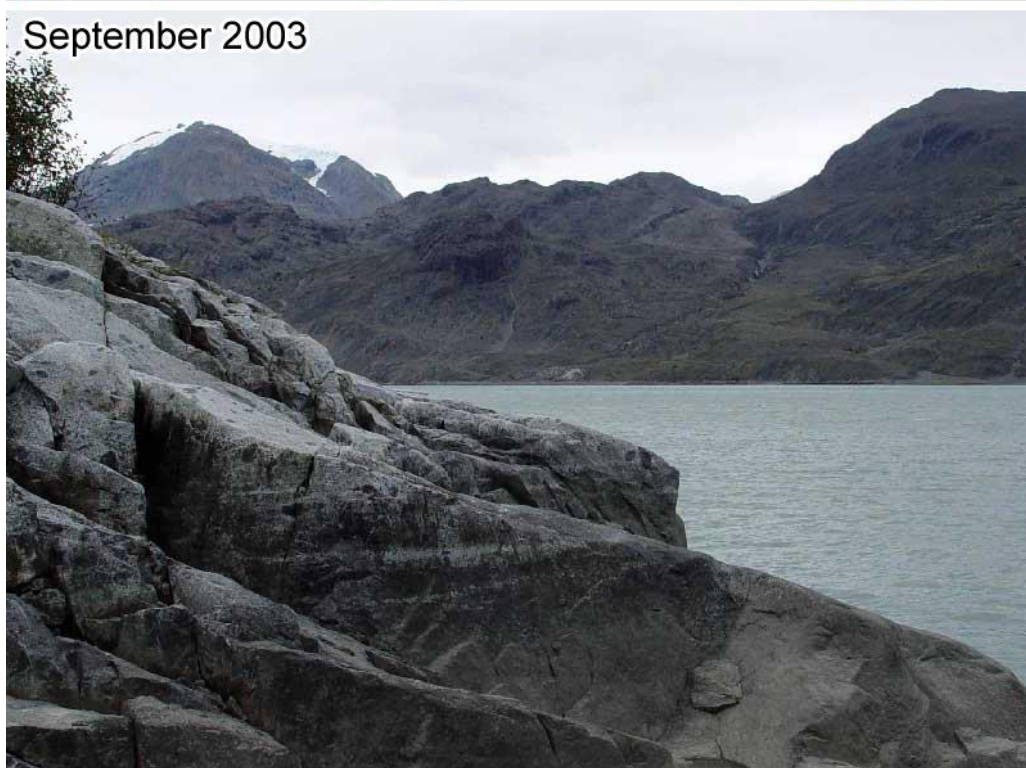
*Sperry Glacier - NE view, Sept. 15, 2007
Photo by Lisa McKeon, USGS*

SOURCE: USGS - Sperry Glacier Terminus, Glacier National Park, Montana - This view of the northeast portion of Sperry Glacier shows evidence of the glacier's recession as well as the advancement of conifer species and other vegetation on the glacial moraines. Top image taken in 1913, bottom image taken in 2007.

https://www.usgs.gov/centers/norock/science/vegetation-sperry-glacier?qt-science_center_objects=0#qt-science_center_objects



SOURCE: USGS - Retreating Muir Glacier - Three northeast-looking photographs taken from a Glacier Bay Photo station that was established in 1941 by William O. Field on White Thunder Ridge, Muir Inlet, Glacier Bay National Park and Preserve, Alaska. The three photographs document the significant changes that have occurred during the 63 years between August 13, 1941 and August 31, 2004. The 1941 photograph shows the lower reaches of Muir Glacier, then a large, tidewater calving valley glacier and its tributary Riggs Glacier. Muir and Riggs Glaciers filled Muir Inlet. The séracs in the lower right-hand corner of the photograph mark the location of Muir Glacier's terminus. The ice thickness in the center of the photographs is more than 0.7 kilometers (0.43 miles). For nearly two centuries prior to 1941, Muir Glacier had been retreating. Maximum retreat exceeded 50 kilometers (31 miles). In places, more than a 1.0 kilometer (0.62 mile) thickness of ice had been lost. Note the absence of any identifiable vegetation and the numerous bare bedrock faces present on both sides of the glacier (W. O. Field, # 41-64, courtesy of the National Snow and Ice Data Center and Glacier Bay National Park and Preserve Archive). The August 4, 1950 photograph, the first of two repeat photographs documents the significant changes that have occurred during the 9 years between it and the 1941 photograph. Muir Glacier has retreated more than 3 kilometers (1.9 miles), exposing Muir Inlet, and thinned 100 meters (328 feet) or more. However, it still is connected with tributary Riggs Glacier. White Thunder Ridge continues to be devoid of vegetation. In places, erosion has removed some of the till from its surface. (W. O. Field, # F50-R29, courtesy of the Glacier Bay National Park and Preserve Archive). The August 31, 2004 photograph, the second repeat photograph, documents the significant changes that have occurred during the 63 years between the first and third photographs and during the 54 years between second and third photographs. Muir Glacier has retreated out of the field of view and is now located more than 7 kilometers (4.4 miles) to the northwest. Riggs Glacier has retreated as much as 0.6 kilometers (0.37 miles) and thinned by more than 0.25 kilometers (0.16 miles). Note the dense vegetation, dominated by Alnus, that has developed on the till cover of White Thunder Ridge. Also note the correlation between Muir Glacier's 1941 thickness and the trimline on the left side of the 2004 photograph. (USGS Photograph by Bruce F. Molnia). https://www2.usgs.gov/climate_landuse/glaciers/repeat_photography.asp



SOURCE: USGS - Retreating Muir Glacier - A pair of north-looking photographs, both taken from the same shoreline location in upper Muir Inlet, Glacier Bay National Park and Preserve, Alaska, that document changes that have occurred during the 27 years between August 15, 1976 and September 8, 2003. The 1976 photograph shows the calving terminus of Muir Glacier extending the width of the fiord. A thinning tributary flows in the valley to its north. Aside from algae growing on a lighter colored dike, there is no vegetation visible in the photograph (1976 USGS Photograph by Bruce F. Molnia). The 2003 photograph documents the disappearance of Muir Glacier from the field of view. The two small cirque glaciers at the upper left have probably not been connected to Muir glacier. Muir Glacier has retreated about 10 kilometers (6.2 miles) to the north. Note that vegetation is beginning to develop. (USGS Photograph by Bruce F. Molnia). https://www2.usgs.gov/climate_landuse/glaciers/repeat_photography.asp

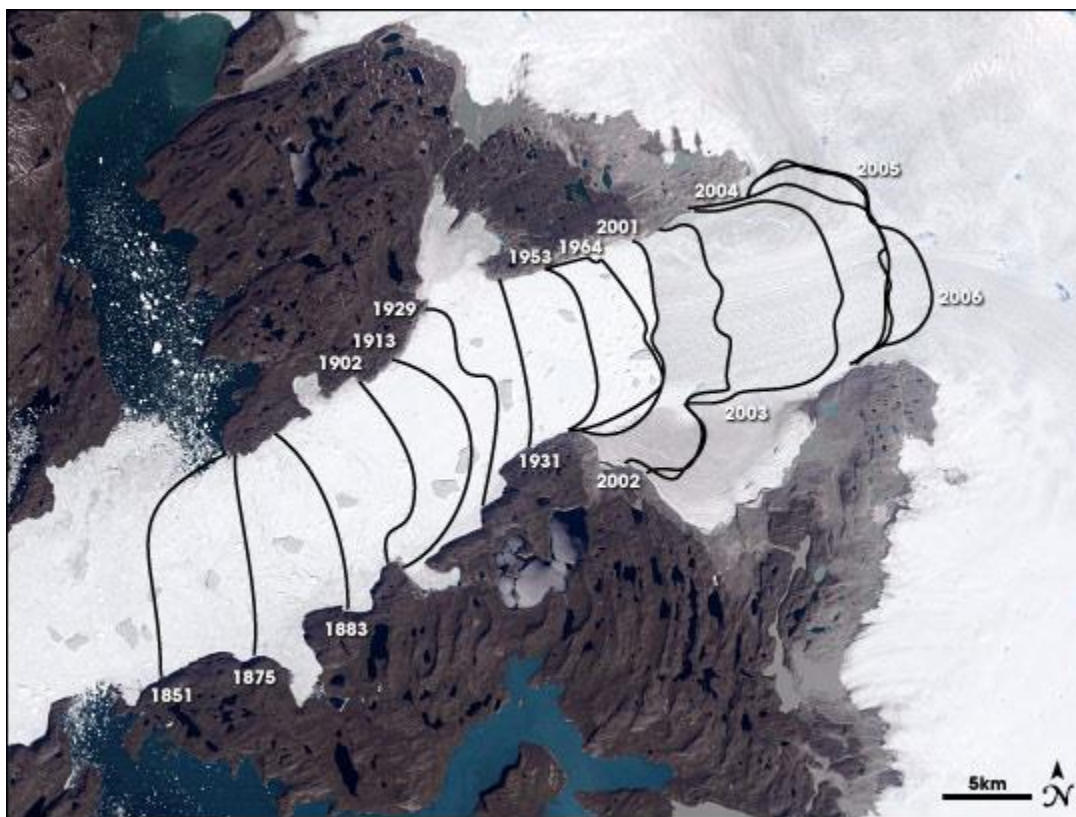


SOURCE: USGS - Retreating Pedersen Glacier Turned Into Wetland - A pair of north looking photographs of Pedersen Glacier, Kenai Mountains, Aialik Bay, Alaska, both taken from the same location on the west shoreline of Aialik Bay. The first photograph is an undated summer view, probably dating from between the mid-1920s and the early 1940s. This photograph is from a postcard labeled Pederson Glacier, Aialik Bay, Alaska. The water in the foreground is part of an ice-marginal lake/lagoon located adjacent to Aialik Bay. When photographed, Pedersen Glacier was calving icebergs into the lake from a séracs-capped terminus that ranged from 20-40 m (66–131 feet) high. No vegetation is visible. (undated, unnumbered postcard; unknown photographer, courtesy of Kenai Fjords National Park). The second photograph dates from August 10, 2005. In the roughly 60 - 80 years between photographs, most of the lake/lagoon has filled with sediment and now supports several varieties of grasses, shrubs, and aquatic plants. Several dozen dead trees are remnants of a mid-20th century forest that was drowned by more than 3 meters (9.8 feet) of down warping of the coast during the 1964 Alaskan Earthquake. Pedersen Glacier's terminus has retreated more than 2 kilometers (1.24 miles). The tributary located high above Pedersen Glacier separated from it sometime during the third quarter of the 20th century. No icebergs are visible. Isolated patches of snow are present at a few higher elevation locations. Note the stands of trees that have developed between the sediment filled wetland and the glacier. (USGS Photograph by Bruce F. Molnia). https://www2.usgs.gov/climate_landuse/glaciers/repeat_photography.asp

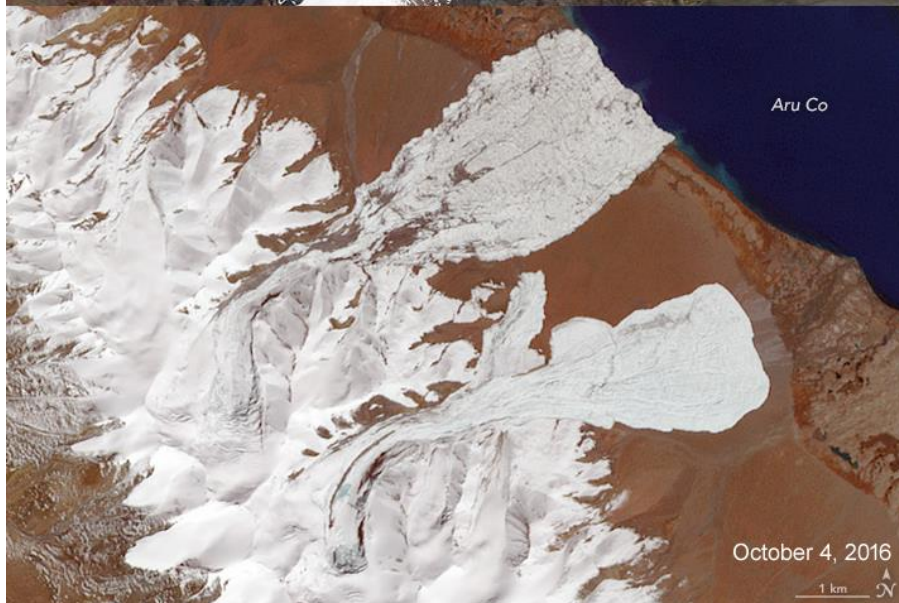
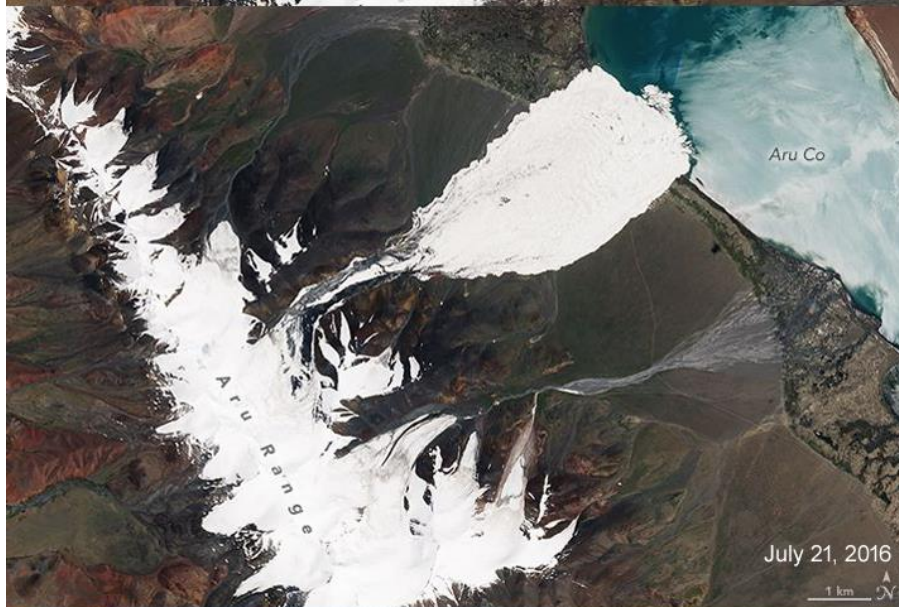


SOURCE: USGS - Retreating Plateau Glacier - Two northwest looking photographs located on the northeast side of Wachusett Inlet, Saint Elias Mountains, Alaska. The September 9, 1961 photograph shows the lower reaches of Plateau Glacier, then a tidewater calving valley glacier with parts of its terminus being land based on either side of the fiord. The central part of the terminus is capped with séracs and rises about 35 meters (115 feet) above tidewater. The terminus has a large semi-circular embayment in its center. Including submarine ice, the total ice thickness here is greater than 200 meters (656 feet). Note the absence of any vegetation in the foreground, which is covered by a boulder till. To the upper right of center, a black, linear medial moraine can be seen on the surface of a tributary to Plateau Glacier that descends from Mount Wordie. Two people are located on the knob in the center of the photograph. (M.T. Millet photograph M-61-P51, courtesy of the Glacier Bay National Park and Preserve Archive). The September 14, 2003 repeat photograph documents changes that occurred during the ensuing 42 years. Plateau Glacier retreated out of the field of view and has all but melted away, after leaving a small remnant, Plateau Remnant, on the flanks of the Bruce Hills (northeast of the field of view). The tributary glacier that formerly supported the medial moraine has retreated more than 2.75 kilometers (1.71 miles), thinned by as much as 275 meters (902 feet), and left an area of debris-covered ice in the path of its retreat. The dense vegetation covering much of the foreground area that was previously only bare boulder till includes *Alnus*, *Salix*, *Populus*, and *Picea*. The vegetation was so dense that the two geologists, wearing orange float-coat, standing at the shoreline on the right side of the peninsula, were unable to reach the point of the headland occupied by the two individuals in the 1961 photograph. (National Park Service photograph by R.D. Karpilo).

https://www2.usgs.gov/climate_landuse/glaciers/repeat_photography.asp



SOURCE: NASA - The Jakobshavn Glacier in western Greenland drains the central ice sheet, and it is retreating inland faster than any other. This image shows the glacier in 2001. The glacier flows from upper right to lower left. The fjord beyond the glacier terminus is packed with seasonal ice and icebergs. Terminus locations before 2001 were determined by surveys; more recent contours were derived from Landsat data. Without measurements of ice thickness, however, the picture of ice loss is incomplete. (NASA image by Cindy Starr, based on data from Ole Bennike and Anker Weidick (Geological Survey of Denmark and Greenland) and Landsat data.)
<https://earthobservatory.nasa.gov/Features/Greenland/printall.php>



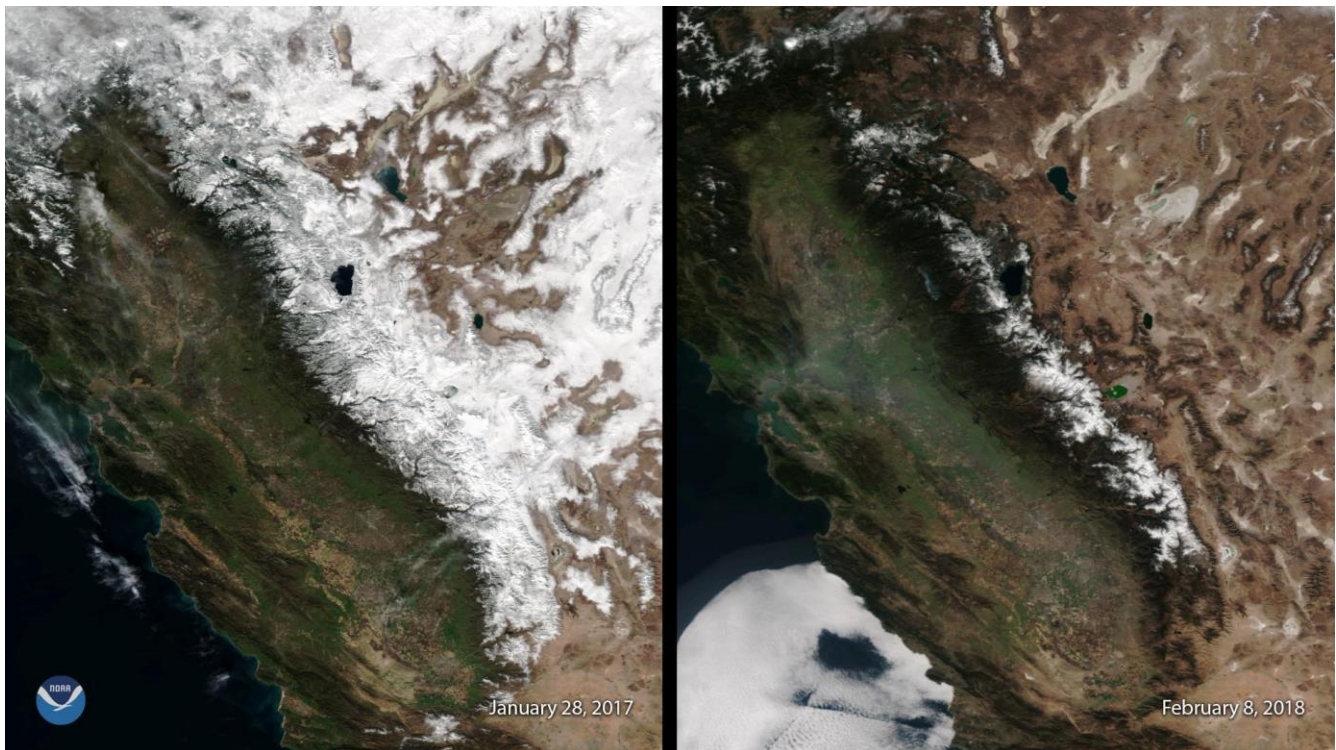
SOURCE: NASA – In July 2016, a massive and mysterious avalanche sent glacial ice and rock spilling down a valley in the Aru Range of Tibet. Leading glaciologists were baffled by what might have caused the avalanche, which killed nine people. In the months before, temperatures had been normal, and there was nothing out of the ordinary about the rainfall. Most surprisingly, the part of the glacier that collapsed sat on fairly flat terrain.

In September 2016, the story got even stranger. A second massive avalanche occurred just a few kilometers to the south of the first. “Even one of these gigantic glacier avalanches is very unusual,” said Andreas Kääb, a glaciologist at the University of Oslo. “Two of them within close geographical and temporal vicinity is, to our best knowledge, unprecedented.”

The massive debris field makes this one of the largest ice avalanches ever recorded. The only event of a comparable size was a 2002 avalanche from Kolka Glacier in in the Caucasus , explained Andreas Kääb, a glaciologist at the University of Oslo.

The cause of the avalanche is unclear. “This is new territory scientifically,” said Kääb. “It is unknown why an entire glacier tongue would shear off like this. We would not have thought this was even possible before Kolka happened.”

<https://earthobservatory.nasa.gov/IOTD/view.php?id=88677> and <https://earthobservatory.nasa.gov/IOTD/view.php?id=88953>

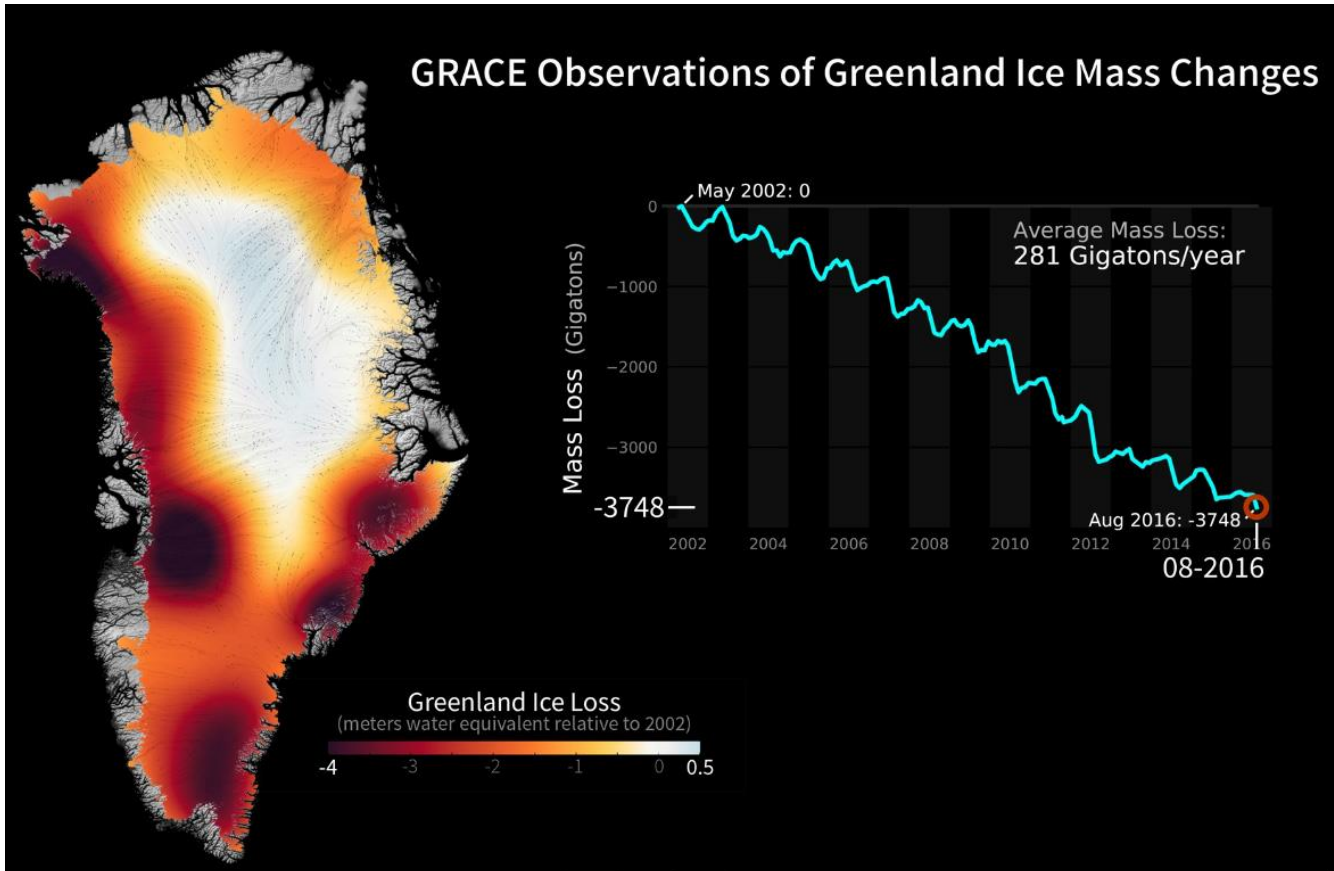


SOURCE: NOAA - A return to below-normal snowfall in the Sierra Nevada in 2018 - This image, captured by the Suomi NPP satellite's VIIRS instrument compares current snow cover in the Sierra Nevada mountains with conditions last year, when well above-average snowfall helped end California's historic five-year drought. The left image, seen January 28, 2017, shows abundant snow cover over the high elevations of California and neighboring Nevada. The right image, seen February 8, 2018, depicts this winter's return to drier conditions and relative lack of snow. The average snow depth across the Sierra Nevada is currently only 3.4 inches, compared with 46.0 inches at the same time in 2017, according to data from NOAA's National Operational Hydrologic Remote Sensing Center. -

<https://www.nesdis.noaa.gov/content/return-below-normal-snowfall-sierra-nevada-2018>

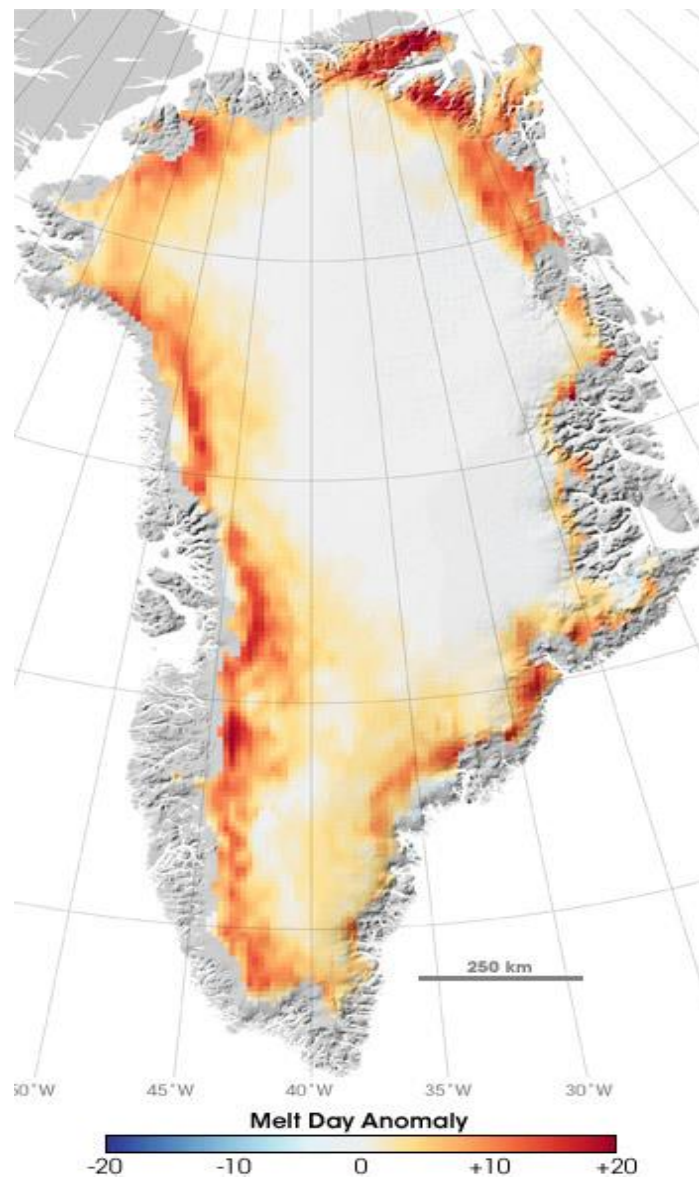
The Greenland Ice Sheet is 1,540 miles (2,480 kilometers) long and up to 465 miles (750 kilometers) wide, and an average of 1.6 miles (2.3 kilometers) thick, it contains around 8% of the Earth's fresh water resources. It has been estimated that if the entire Greenland Ice Sheet melted, global sea levels would rise 23 feet. It has been estimated that the Greenland Ice Sheet has lost hundreds of gigatons of mass since 1994 and it will most likely continue so long as the global warming continues. Melting could either possibly accelerate and happen much more rapidly than predicted, or if global emissions are eliminated the Greenland Ice Sheet could possibly stabilize and even increase. (559)

GRACE Observations of Greenland Ice Mass Changes

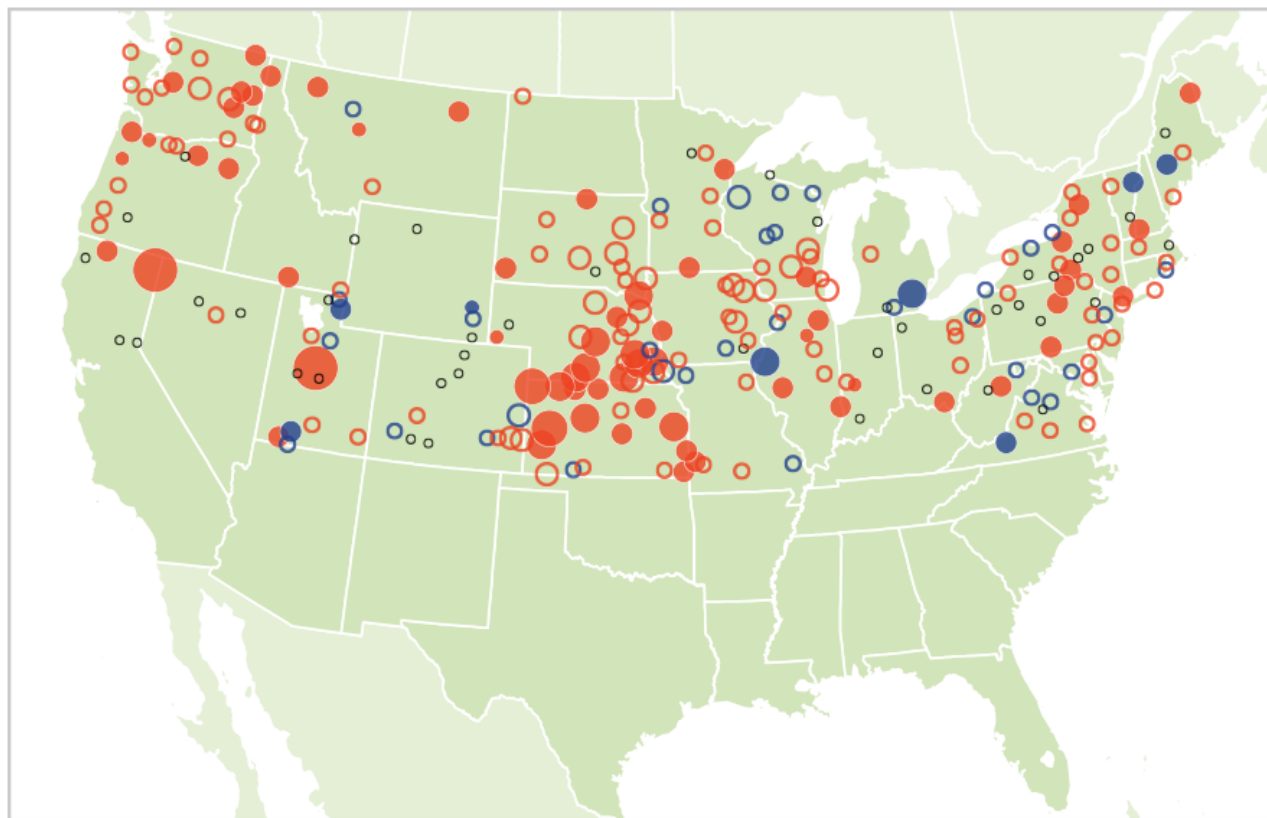


SOURCE: NASA - The mass of the Greenland ice sheet has rapidly declined in the last several years due to surface melting and iceberg calving. Research based on observations from the NASA/German Aerospace Center's twin Gravity Recovery and Climate Experiment (GRACE) satellites indicates that between 2002 and 2016, Greenland shed approximately 280 gigatons of ice per year, causing global sea level to rise by 0.03 inches (0.8 millimeters) per year. These images, created from GRACE data, show changes in Greenland ice mass since 2002. Orange and red shades indicate areas that lost ice mass, while light blue shades indicate areas that gained ice mass. White indicates areas where there has been very little or no change in ice mass since 2002. In general, higher-elevation areas near the center of Greenland experienced little to no change, while lower-elevation and coastal areas experienced up to 13.1 feet (4 meters) of ice mass loss (expressed in equivalent-water-height; dark red) over a 14-year period. The largest mass decreases of up to 11.8 inches (30 centimeters (equivalent-water-height) per year occurred along the West Greenland coast. The average flow lines (grey; created from satellite radar interferometry) of Greenland's ice converge into the locations of prominent outlet glaciers, and coincide with areas of high mass loss.

<https://gracefo.jpl.nasa.gov/resources/33/greenland-ice-loss-2002-2016/>

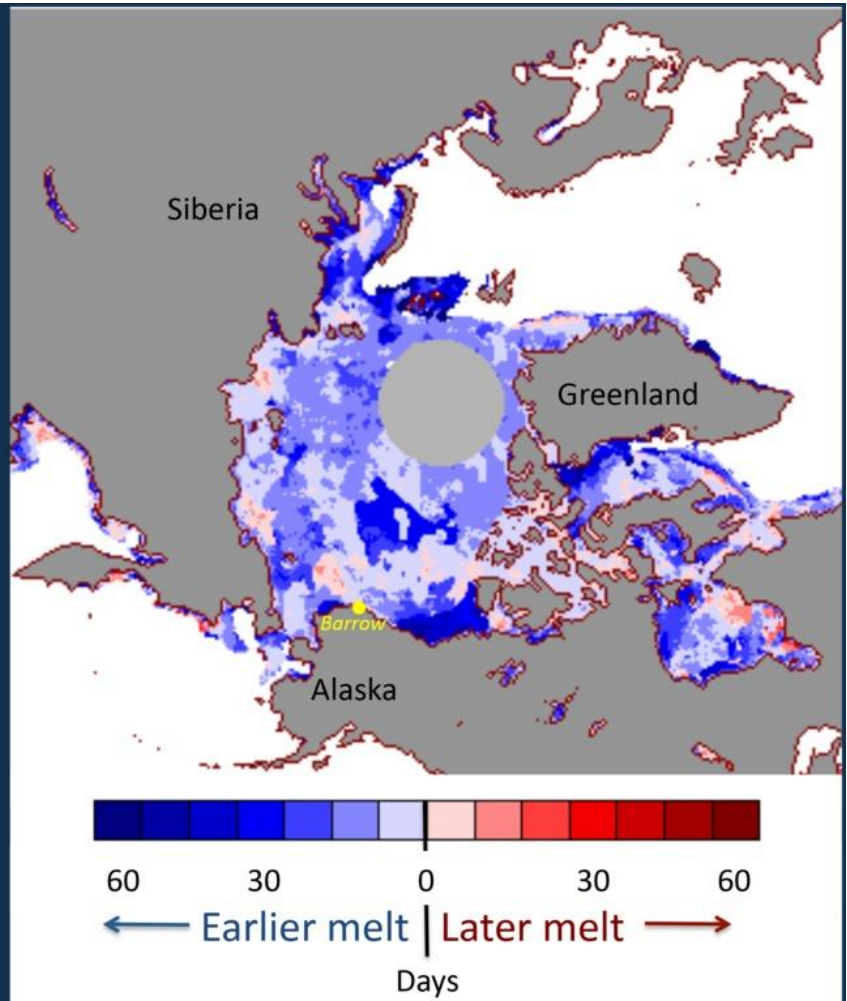


SOURCE: NASA - Warmer temperatures are increasing the number of summer days when portions of the surface of the Greenland Ice Sheet melt. Along the margins of the ice sheet, up to 20 additional days of melting occurred in 2005 compared to the average since 1988. (NASA map by Robert Simmon and Marit Jentoft-Nilsen, based on data from Marco Tedesco, GSFC.)
<https://earthobservatory.nasa.gov/Features/Greenland/printall.php>

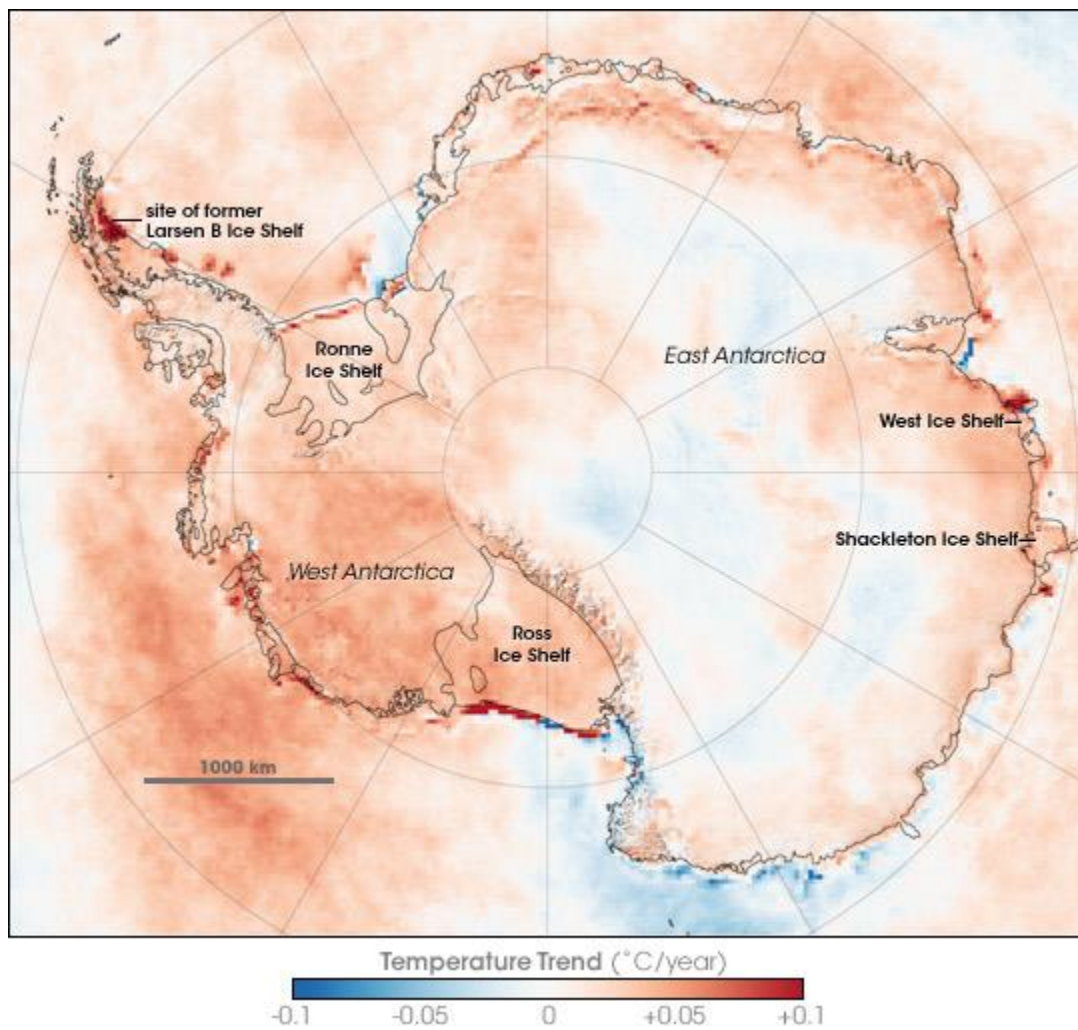


SOURCE: EPA – Date source: NOAA, 2016 - This figure shows the percentage change in winter snow-to-precipitation ratio from 1949 to 2016 at 246 weather stations in the contiguous 48 states. This ratio measures what percentage of total winter precipitation falls in the form of snow. A decrease (red circle) indicates that more precipitation is falling in the form of rain instead of snow. Solid-color circles represent stations where the trend was statistically significant.

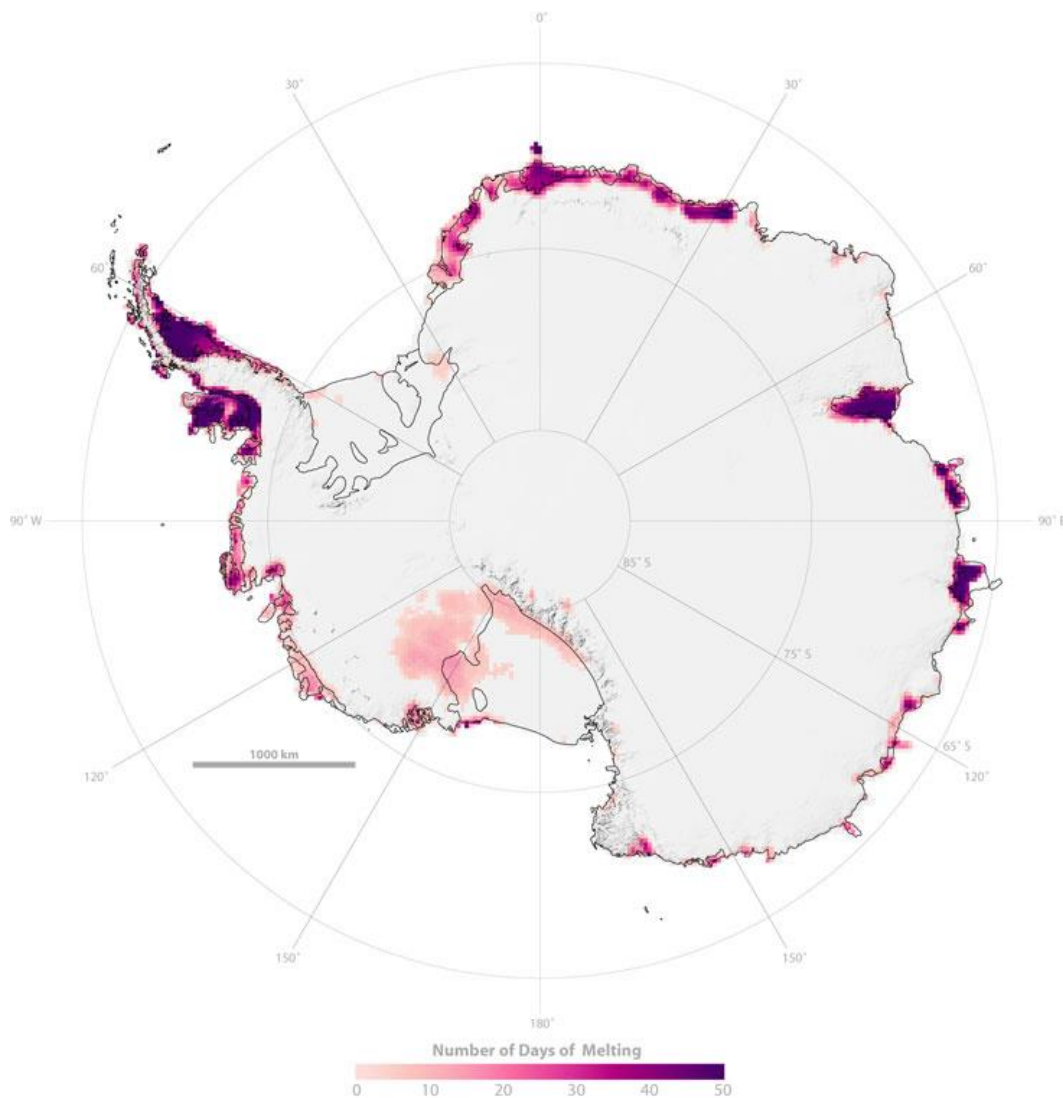
Sea ice began melting earlier than normal this year



SOURCE: NASA/Meier – 2016 Map showing the number of days, earlier or later than the long-term average, when sea ice began to melt in the Arctic.



Source: NASA - This image illustrates long-term changes in yearly surface temperature in and around Antarctica between 1981 and 2007.



Source: NASA - A 2007 NASA study utilizing 20 years of data from space-based sensors confirmed that Antarctic snow is melting farther inland from the coast over time, melting at higher altitudes, and increasingly melting on Antarctica's largest ice shelf.

Antarctica and the Arctic are changing very rapidly from a combination of warming oceans and a warming atmosphere. Central West Antarctica is among the most rapidly warming regions on Earth. (392) Over the last 30 years Antarctic sea ice has increased slightly, but these gains are exceeded by major decreases in Arctic sea ice, and there has been in fact a global sea ice decrease. For the last three decades, Arctic sea ice maxima and minima have been decreasing dramatically. The average monthly extent for September sea ice declined by 13.4% per decade, between 1979 and 2015. Satellite observations have also concluded that in all geographic areas, during all months, and for every season, Arctic sea ice extent is less today than it was during the 1980s and 1990s. (391) In 2008, the US National Snow and Ice Center reported that, for the first time since record keeping began, both the Northwest Passage the Northern Sea Route were melted during the summer, and this allowed for a ring of navigable waters in the Arctic.



Source: EPA / NASA

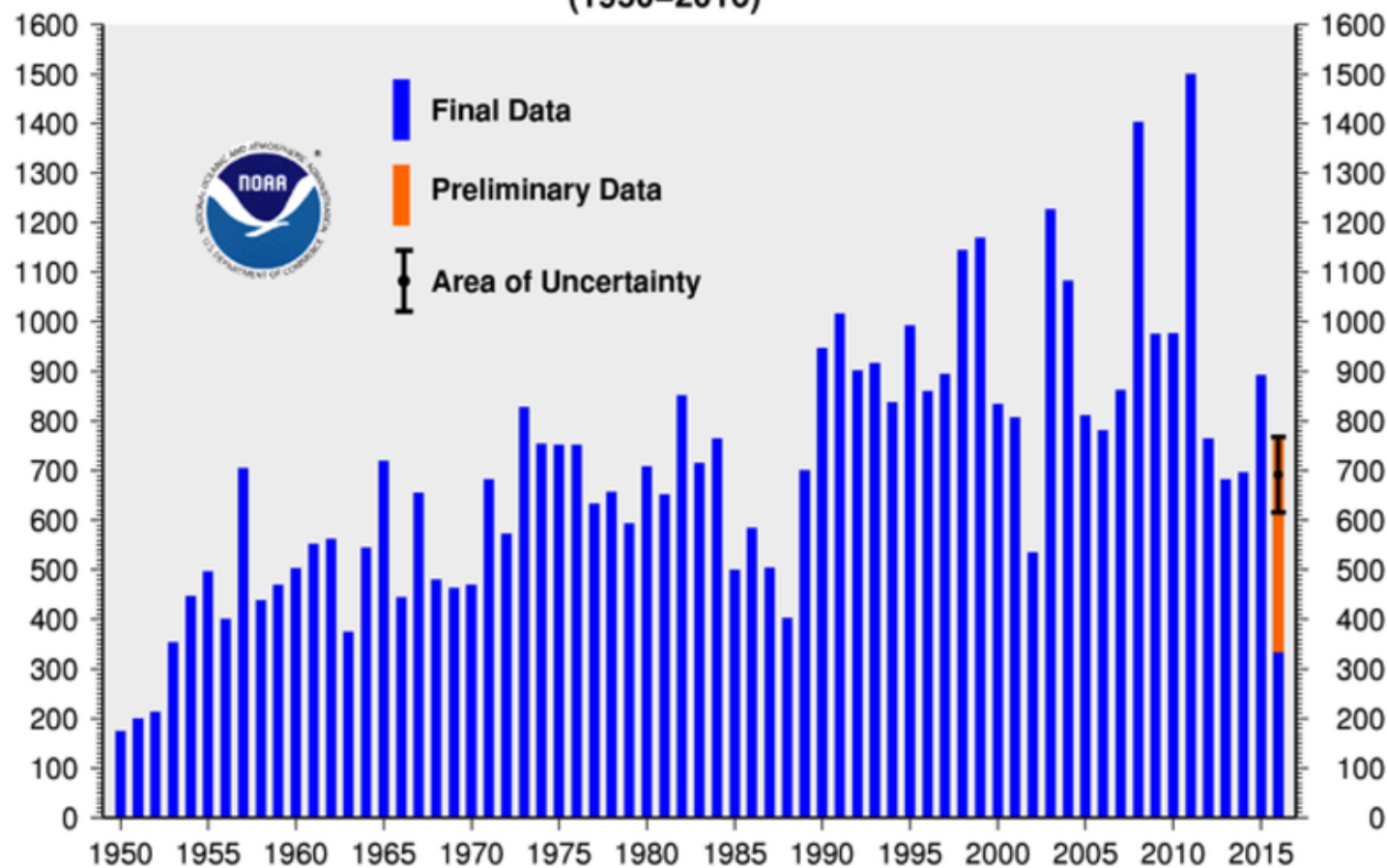
Severe Weather

Severe catastrophic weather events (e.g. drought, extreme temperature fluctuations, heat waves, blizzards, wildfires, tornadoes, tropical cyclones, floods, etc.) are happening now more frequently than in the past, and they are increasing in intensity. The November 2015 issue of National Geographic Magazine reported that in 1989 there were 291 catastrophic weather events, and then this number skyrocketed to 904 catastrophic weather events

in 2014. There has also been an increase in natural disasters worldwide. A 2012 report by Munich Re found that there was at least a 150% increase in the number of weather related loss events on every continent, excluding Antarctica, between 1980 and 2011 (102)

There have also been unusual weather events like the several incidents of extreme lightning occurring around the globe. In the southern Indian state of Andhra Pradesh 36,749 lightning strikes were recorded over a 13-hour period on April 24, 2018. (108) Then on May 27, 2018 around 15,000 lightning strikes were observed in southern Britain within 4 hours. (110) Then on June 1, 2018 more than 20,000 lightning strikes occurred across central Nebraska and south-central South Dakota in a 5-hour period. (111) The Super Outbreak of 2011 had 207 confirmed tornadoes which occurred within 24 hours and a total of 337 tornadoes occurring during the entire outbreak, of which 11 were EF4s and 4 were EF5s. Other weather records have been broken recently like the most snow in a 24-hour period, which was set on March 5, 2015 in Capracotta, Italy where 2.56 meters (100.8 inches) of snow fell. On July 21, 2016 a temperature of 54.0 °C (129.2 °F) was recorded in Mitribah, Kuwait, tying Death Valley's highest reliably recorded temperature on Earth, and on the same day in Basra, Iraq the temperature reached 53.9 °C (129.0 °F). Then on June 29, 2017 the temperature at the airport in Ahvaz, Iran reached 54.0 °C (129.2 °F). The 2013 extreme weather events which occurred are also further examples of the effects of global warming and the resulting climate change. Further evidence can be seen in the mid-April 2018 weather in the United States which was very abnormal, wildfires were raging in Oklahoma which burned nearly 350,000 acres, while at the same time just north there were blizzard conditions from winter storm Xanto, and tornados were impacting some southern states. (715)

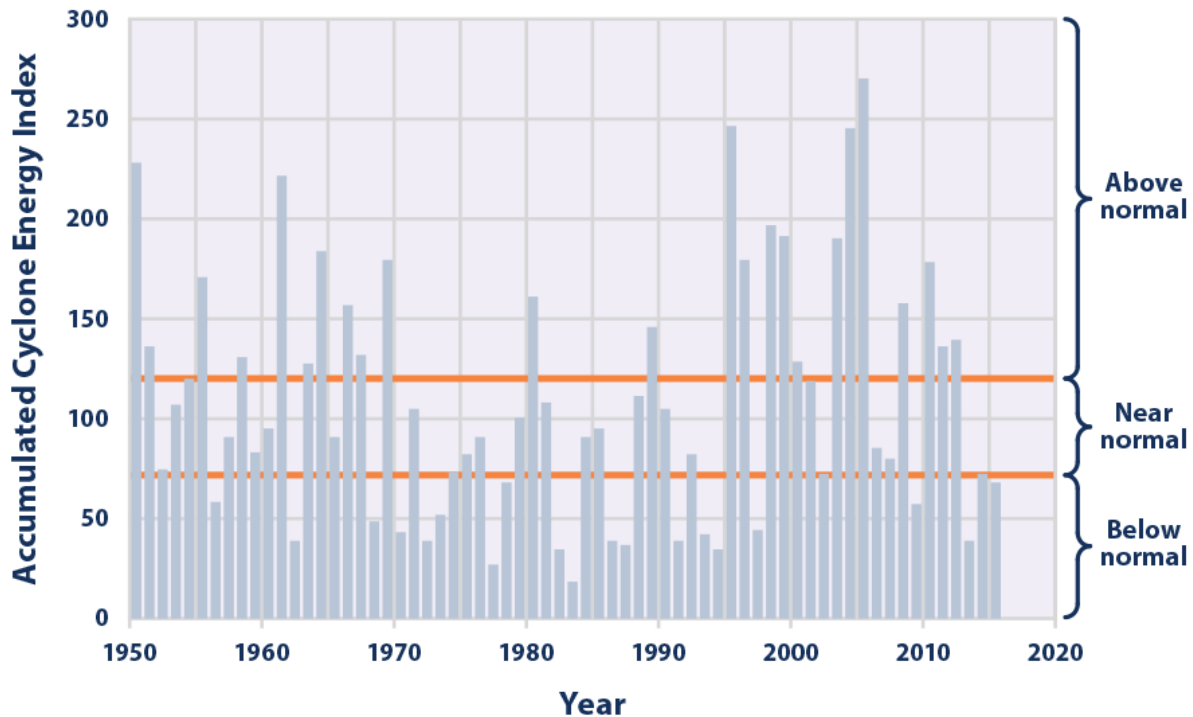
Jan-Jul Total Number of Tornadoes (1950–2016)



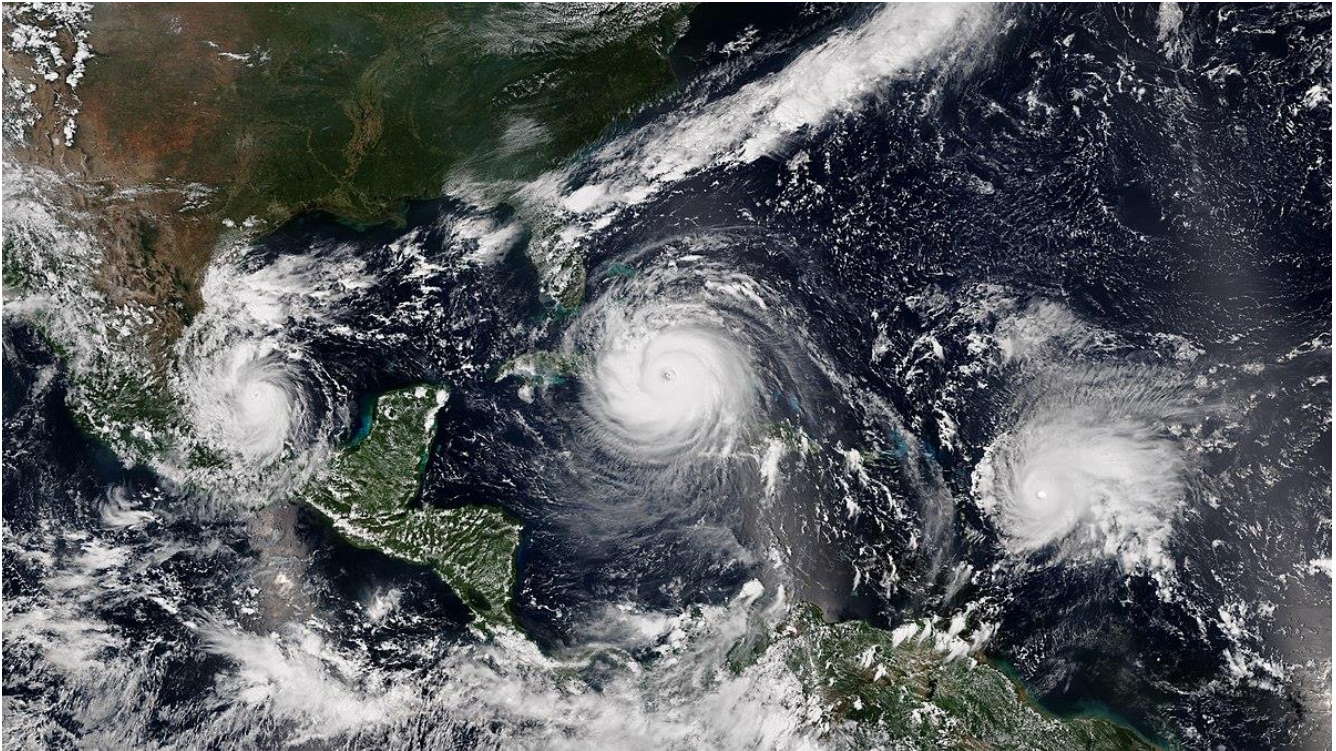
SOURCE: NOAA

5 of the 10 the most intense Atlantic hurricanes on record with a mbar (hPa) between 882 and 908 occurred in

the years 2005[3], 2007[1], and 2017[1]. Both the 2005 and 2017 Atlantic hurricane seasons were extremely hyperactive setting both occurrence and severity records. The 2005, 2007, and 2017 Atlantic hurricane seasons each had 2 or more category 5 hurricanes make landfall. Hurricane Vince in 2005 and Hurricane Ophelia in 2017 both formed in the eastern Atlantic and made landfall in Europe, a rare occurrence which has not been recorded since the 1842 Spain hurricane. In May of 2018 two rare tropical cyclones Sagar and Mekunu impacted the Gulf of Aden region. Another extremely rare cyclone formed in an area that almost never sees tropical cyclones off the coast of Chile in early May 2018. (137) Since the 1950s, winter storms have also increased in frequency and intensity while their tracks have shifted northward over the United States. (1) The 3 back-to-back nor'easters between January 23 and February 2, 2015 and the 4 successive nor'easters between March 1, 2018 and March 20, 2018 are both examples of this.



SOURCE: EPA - Data source: NOAA, 2016 - This figure shows total annual Accumulated Cyclone Energy (ACE) Index values, which account for cyclone strength, duration, and frequency, from 1950 through 2015. The National Oceanic and Atmospheric Administration has defined “near normal,” “above normal,” and “below normal” ranges based on the distribution of ACE Index values over the 30 years from 1981 to 2010. <https://www.epa.gov/climate-indicators/climate-change-indicators-tropical-cyclone-activity#7>



SOURCE: NOAA - Satellite image taken on September 8, 2017 showing 3 active hurricanes, Hurricane Katia, Hurricane Irma, and Hurricane Jose. <https://www.nnvl.noaa.gov/view/globaldata.html#TRUE?timespan=daily&date=2017-09-08&lat=20.954573314186&lon=-76.318223175068&zoom=5>

Critics of Global Warming like to argue about the '*Global Warming Hiatus of 2002 - 2009*', unfortunately these fluctuations only give a false positive, and the long-term trends cannot be denied. 2016 was the 40th consecutive year with above average temperatures and independent analysis by NASA and NOAA confirmed that Earth's 2016 surface temperatures were the warmest since modern record keeping began in 1880. In addition, 8 months out of the year set new records, January through September, with the exception of June, were the warmest months on record for those respective months. October, November, and December were also the second warmest of those months on record behind records set in 2015. Most of the warming has occurred over the past 35 years, with 16 of the 17 warmest years on record occurring since 2001. 2015 was the first time the global average temperatures were 1 degree Celsius or more above the 1880 to 1899 average. (80) NASA reported, that July 2017 was statistically tied with July 2016 as the warmest July in that last 137 years since modern record-keeping began. (536) In July 2016, a temperature of 54 °C (129.3 °F) was observed in Kuwait and Iraq. This was the hottest temperature ever recorded on Earth with modern meteorological instruments. (384) The 'Millennium Drought', which has been strongly correlated with global warming, produced drier conditions and extreme winds resulting in an increase and intensity of dust storms throughout the world in recent years. On October 23, 2002 and September 23, 2009, two extreme dust storms hit eastern Australia, the '*Red Dawn*' dust storm in September 2009 was the largest in recorded Australian history. The 2016 NOAA State of the Climate report noted that,

"The summer (June-August) temperature for the contiguous U.S. was 73.5°F, or 2.1°F above the 20th century average, tying 2006 as the fifth warmest in the 122-year period of record. The August temperature was 73.6°F, 1.5°F above the 20th century average, making it the 17th warmest on record. During August, record warmth was observed across the Northeast with below-average temperatures in the Southwest. The year-to-date (January-August) contiguous U.S. average temperature was 56.7°F, 2.8°F above average. Alaska continued to be record warm for the first eight months of 2016.

Above-average temperatures spanned the nation during summer. Every state across the contiguous U.S., had a statewide temperature that was above average. Twenty-nine states across the West and in the East were much warmer than average. California, Connecticut and Rhode Island each had their warmest summer on record. The California statewide average temperature was 75.5°F, 3.3°F above average, the Connecticut statewide average temperature was 71.9°F, 3.7°F above average, and the Rhode Island statewide average temperature was 71.6°F, 3.7°F above average. Alaska observed its second warmest summer in its 92-year record at 53.6°F, 3.0°F above average. Only the summer of 2004 was warmer with a statewide temperature value of 55.9°F. Several locations across the state were record warm including Anchorage, Kenai, King Salmon

and Yakutat. The Alaska year-to-date temperature was 36.4°F, 7.6°F above average, surpassing the previous record warm January-August of 1981 by 3.0°F. Record and near-record warmth engulfed Alaska for much of 2016.

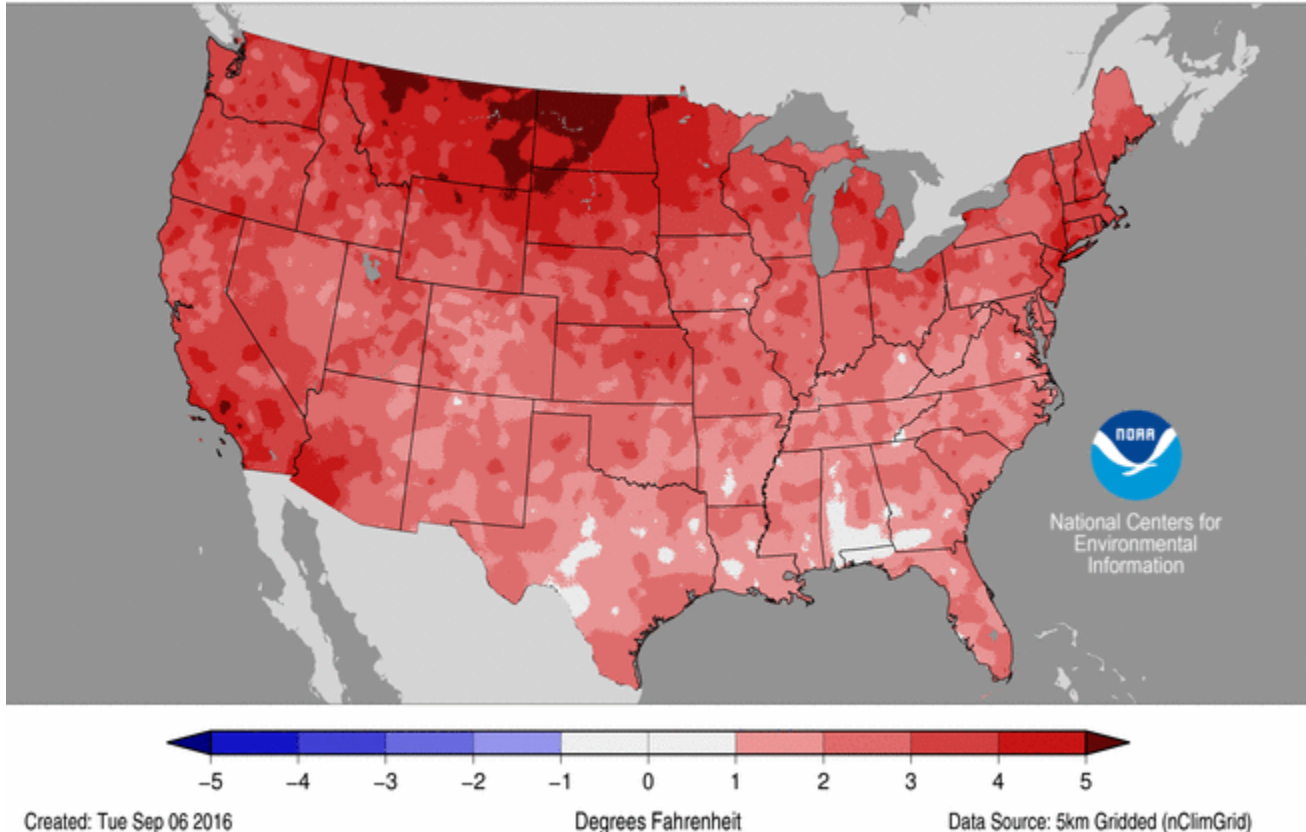
The contiguous U.S. precipitation total of 3.47 inches was second only to 1977. Record and near-record precipitation was observed across parts of the Southwest, Southern Plains and Midwest. Ten states had monthly precipitation totals that were much above-average with the Louisiana precipitation total record high. The Louisiana statewide precipitation total was 12.91 inches, 8.27 inches above average, and surpassed the previous record of 9.71 inches in 1948. In mid-August, a nearly stationary low pressure system dumped torrential rainfall across southern Louisiana causing record flooding for large parts of the state. Precipitation totals over 20 inches were widespread with localized totals exceeding 30 inches. The U.S. Climate Reference Network (USCRN) station at Lafayette, Louisiana received 22.89 inches on the 11th and 12th, setting a new record for highest two-day precipitation total for any USCRN station in the contiguous U.S. The record flooding contributed to at least 13 fatalities.” (160)

All of these documented weather changes are a result of global warming, and even further evidence that it is occurring. So why then is extreme or abnormal weather referred to by weathermen as just weird or unseasonable, and with no correlation to global warming? Why is extreme weather so easily dismissed as simply an unexplainable natural phenomenon that occurs, when there is clear evidence that some is a result of anthropogenic activities? Why is there no surprise or questioning when old weather records are surpassed? Why do some meteorologists instead have an attitude of excitement, and as if it's some achievement to have broken the record? Perhaps the world would be better off if meteorologist were more like the '*Jim Jefferies Show Weatherman*'. Will the extreme weather events only continue to increase in frequency and severity? How will the weather be affected in the future as a result of fresh water being released into the cycle from melting glaciers, permafrost, sea ice, and polar ice caps? Doug Hamilton's 2018 NOVA documentary '*Decoding the Weather Machine*' details the rapidly changing climate and the effect it is having on the weather.

Mean Temperature Departures from Average

January–August 2016

Average Period: 20th Century



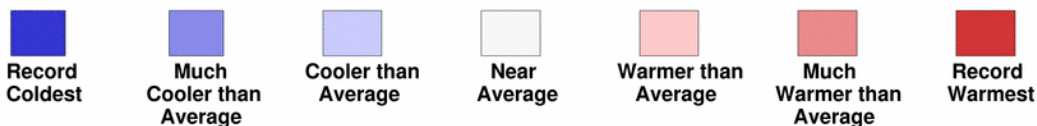
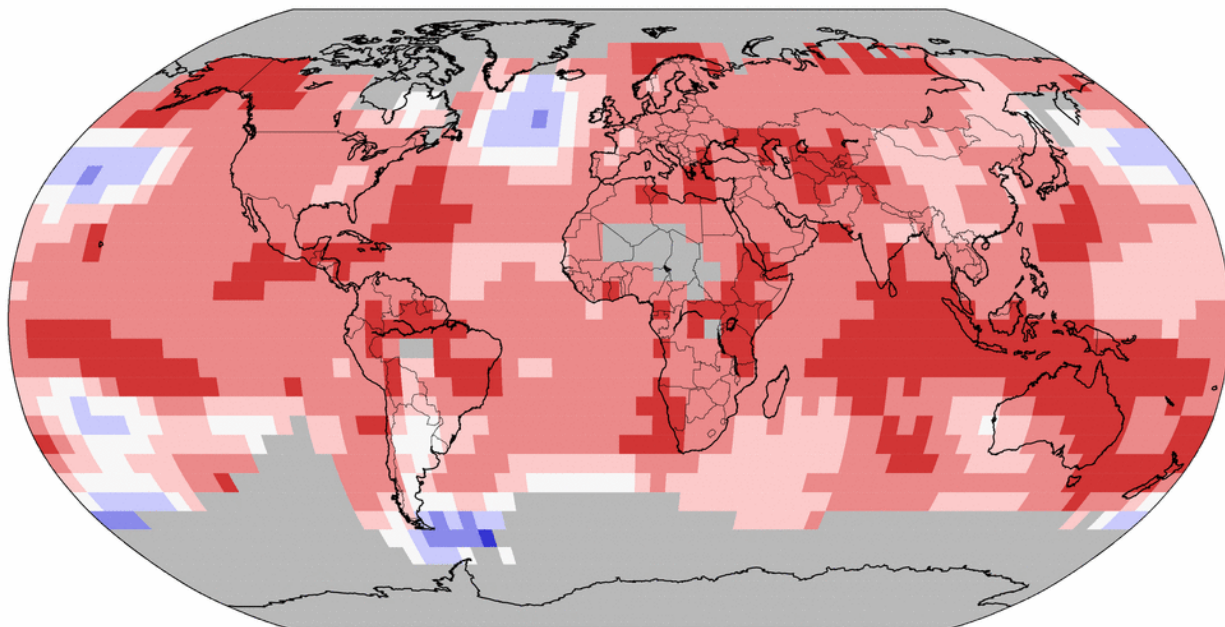
Meteorologist once believed the highest heat index reading that could ever be attained anywhere on Earth was approximately 160 °F (71 °C), yet on July 8, 2003 in Dhahran, Saudi Arabia a heat index of 172 °F (78 °C) was observed. It should also not be forgotten, that the extremes *Homo sapiens* have witnessed in recent history are nothing in comparison to other planets in the solar system. Neptune has sustained winds of 1,300 mph (2,092 kph) and a temperature of -353 °F (-214 °C), Jupiter has an anticyclonic storm that has been continuous for more than 180 years, and Venus has a mean surface temperature of 863 °F (462 °C). Even more extreme weather, which has never been observed here on Earth is always a possibility, especially when nature's equilibrium formula is thrown out of balance.

Nature has more extreme limits than those which have been recorded by *Homo sapiens* during their brief observations of the weather on Earth. Just because it hasn't happened in recorded history does not mean it isn't possible, that a intense hail storms could not produce massive hail 1 foot in diameter or more, that a tropical cyclone could obtain 300 mph (483 kph) winds or more, that an area could receive 50 inches of rainfall or more in 1 hour or less, that warmer oceans could produce year-round tropical cyclones which could make landfall on any coastline of the world, or that other extreme weather events could occur given the right planetary conditions. The weather systems that occur on Earth are a perfectly balanced system, and when the temperature rises, more water is added to the equation from melting ice regions, along with other possible anthropogenic influences, weather could become very radical and even more extreme in the future. One need only watch the '*Year of Weather*' by the European Organisation for the Exploitation of Meteorological Satellites EUMETSAT to see this already beginning. https://www.youtube.com/results?search_query=Year+of+Weather+by+EUMETSAT

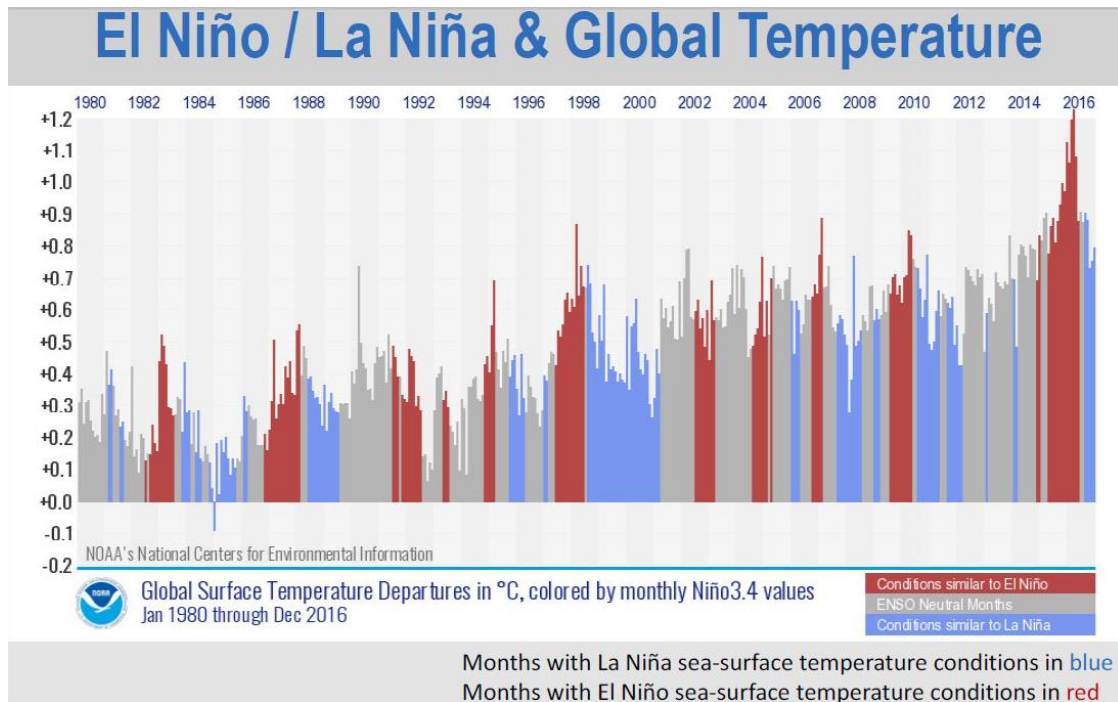
Land & Ocean Temperature Percentiles Jan–Jul 2016

NOAA's National Centers for Environmental Information

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0



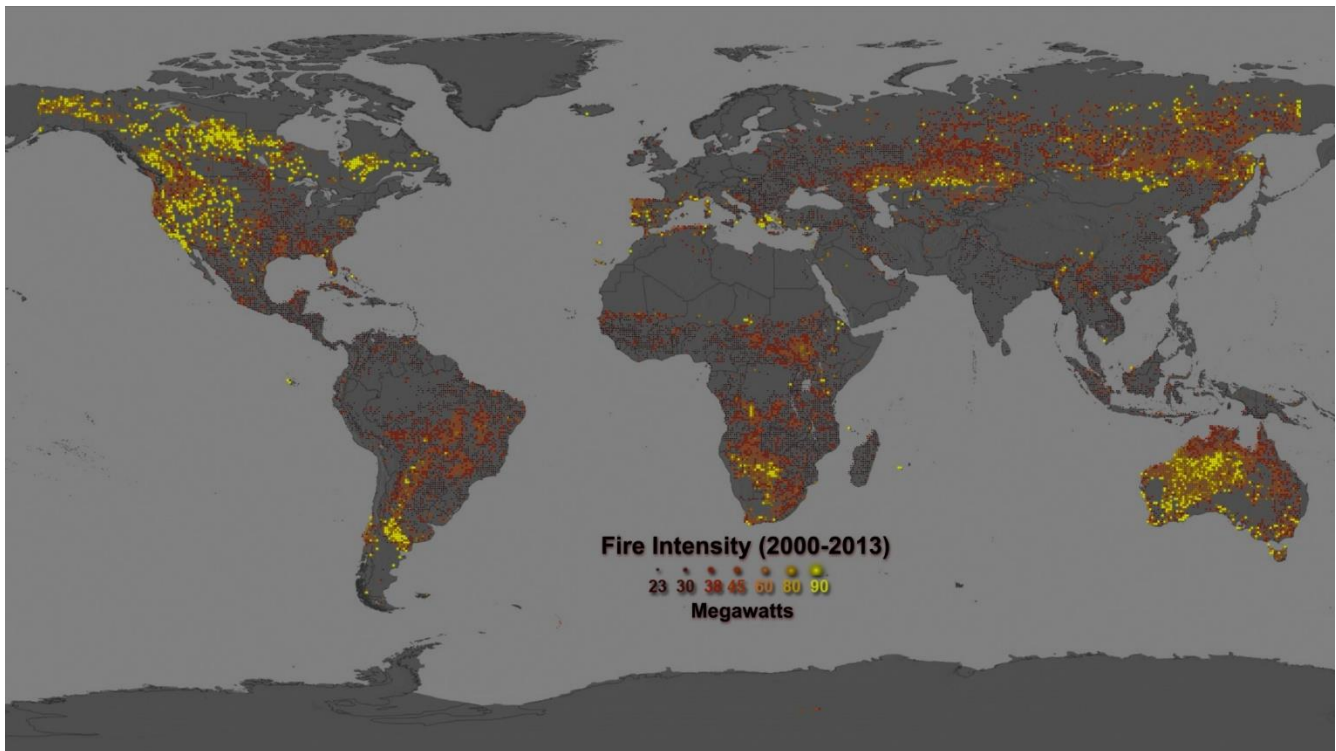
Mon Aug 15 07:11:32 EDT 2016



SOURCE: NOAA/NASA - Annual Global Analysis for 2016 - January 2017

Wildfires

Wildfires have occurred on Earth for 420,000,000 years, since the first terrestrial florae appeared, thus the fire suppression techniques practiced in the past and present are futile. Fire is a natural occurrence and suppressing fire in the wilds of nature will only lead to devastating more intense fires in the future. Flora debris builds layer upon layer creating an excessive amount of fuel for a fire which is inevitably going to occur at some point. The Spanish government banned fires in California during their conquest of it, and it resulted in a debris building up which eventually led to larger and more frequent fires. Even the infernos which engulfed the United States National Forests in the 1960s, 1970s, and 1980s were a result, in part, because of fire suppression techniques practiced decades earlier. Attempting to suppress a natural process like wildfires with fuel breaks in an attempt to compartmentalize wildfire spatial distribution, could potentially work to an extent, but it will also most definitely cause negative ecological impacts on the ecosystems through the conversion of hundreds of thousands of acres into firebreaks, and ultimately also result in habitat loss for millions of florae and faunae.



SOURCE: NASA - Between 2000-2013, the MODIS satellite monitored fires across the world. Agricultural and prescribed fires are shown in dark red. More intense fires are shown in orange and the most intense are shown in bright yellow.

And although 84% of wildfires were human-ignited wildfires versus lightning-ignited wildfires, between 1992 and 2012, (455) wildfires today are ultimately being fueled by global warming. The Geneva Association released a bulletin in April 2014, in it they stated,

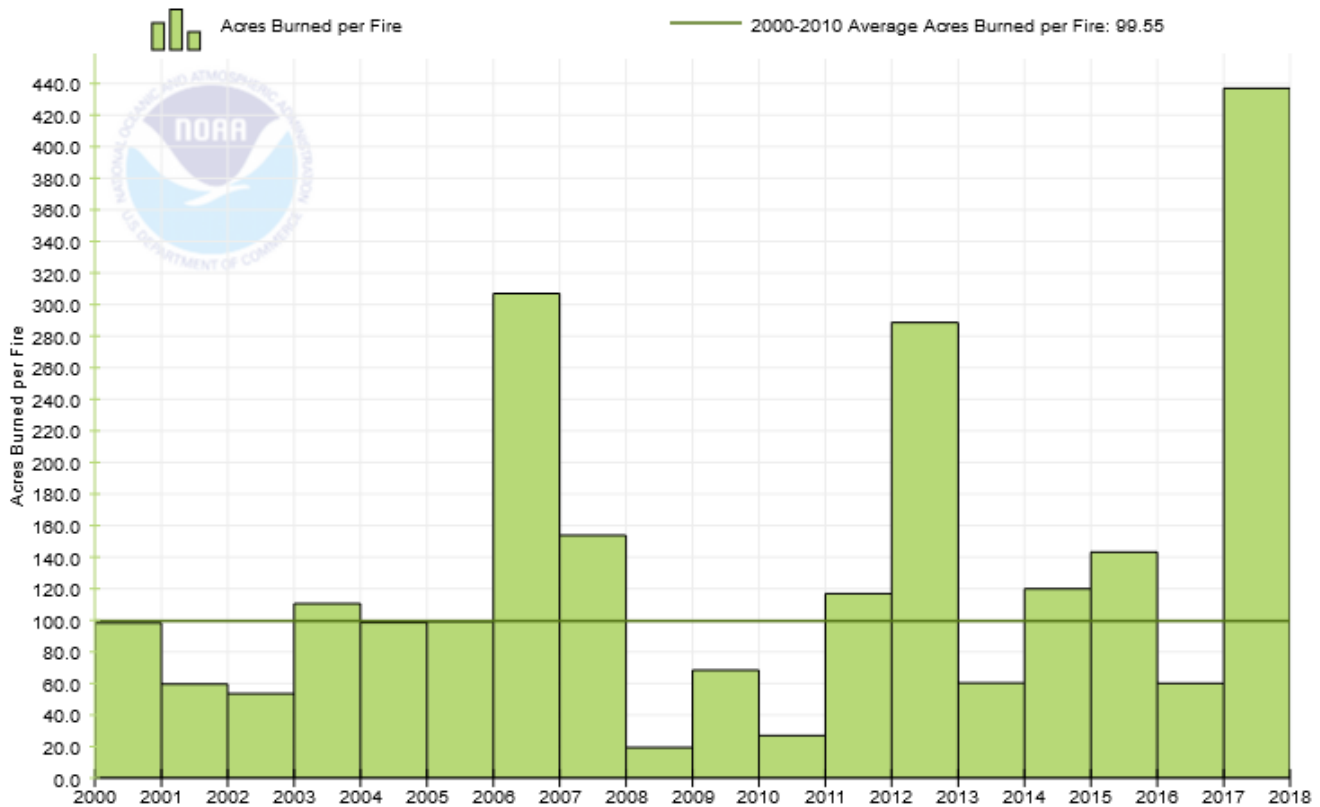
"...the intensity, frequency and duration of wildfires are now considered to be directly influenced by global warming.

The bushfires that ravaged New South Wales, Australia, in October 2013 after record-high temperatures earlier in spring, prompted the statement in a CNN interview from Christina Figueres, the executive secretary of the United Nations Framework Convention on Climate Change (UNFCCC) quoted by The Verge, that global warming is "absolutely" linked to a recent spate of wildfires and heat waves.

Wildfires are not only a result of a changing climate, however; they also emit greenhouse gases and therefore also contribute to global warming. Increased temperatures mean more fires, which will raise temperatures even further." (70)

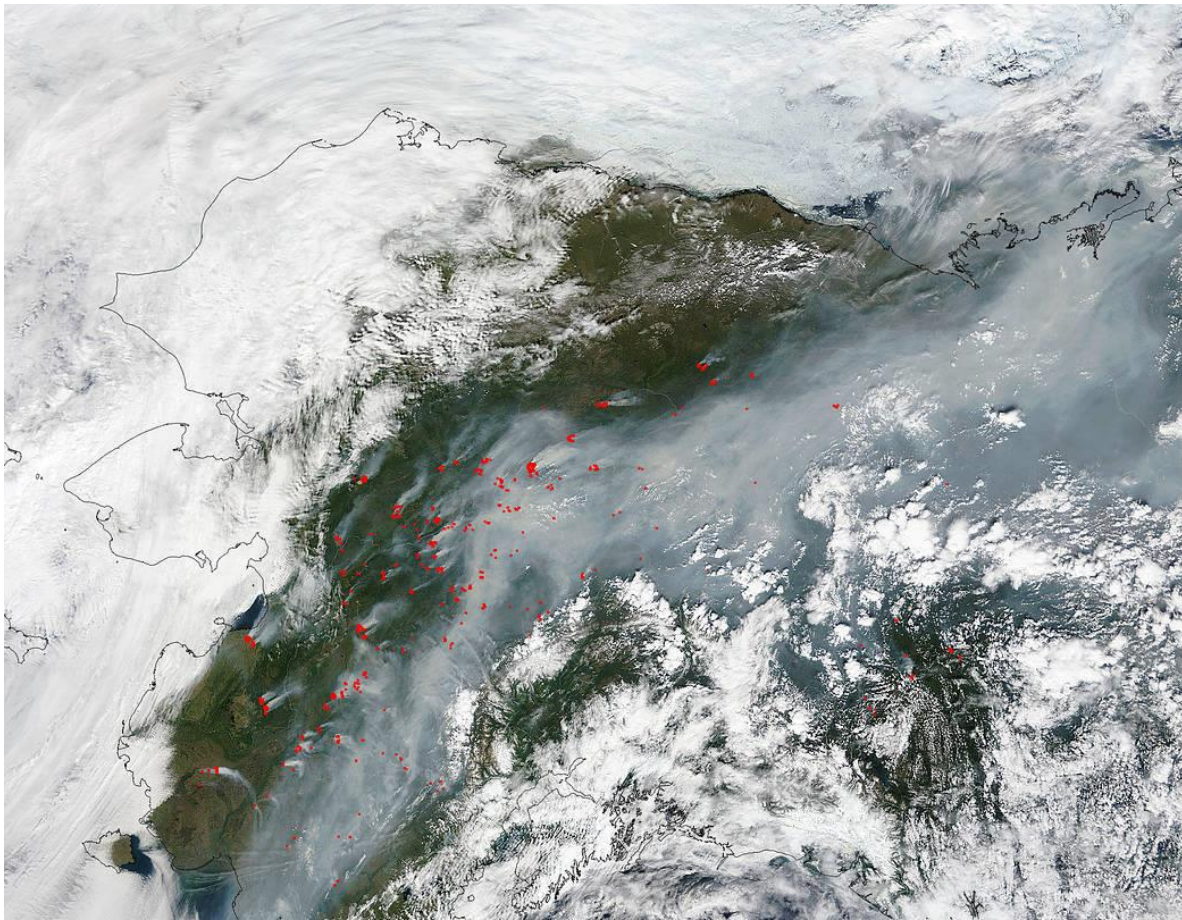
Wildfires were once confined to certain seasons, but now with global warming wildfires burn earlier and longer, with some areas having a year-long fire season now. In California, over the last 30 years the fire season has increased by 84 days, to 220 days total per year. 14 of the 20 largest known California wildfires were between 2002 and 2017. (456) 2017 was the by far the worst wildfire season in California on record, with 9,053 fires burning more than 1,240,000 acres, whereas the 5-year average over the same interval was 4,806 fires burning 202,751 acres. (613) The Thomas fire of 2017 was largest wildfire in California recorded history and was not in during the normal fire season summer months, it was in December. In December 2012, NASA reported that drier conditions would most likely cause increased fire activity across the United States. Increased fires over the previous 25 years has also resulted in more carbon emissions, which have grown from an average of 8,800,000 tons per year between 1984 and 1995, to an average of 22,000,000 tons per year between 1996 and 2008. Research done by Hsiao-Wen Lin using satellite data, shows agricultural and prescribed fires account for 70 percent of the total number of active fires in the continental United States, and that agricultural fires have increased 30 percent over the last decade. (77)

September U.S. Wildfires (2000-2017)



SOURCE: NOAA - For September, 3,033 fires (2nd least since 2000) burned 1,325,423 acres (2nd most on record), which is 437.0 acres burned/fire (most on record). For January - September, 49,526 fires (6th least since 2000) burned 8,464,884 acres (4th most on record), which is 170.9 acres burned/fire (3rd most on record). [https://www.ncdc.noaa.gov/societal-impacts/wildfires/month/9?params\[\]=apf&end_date=2017](https://www.ncdc.noaa.gov/societal-impacts/wildfires/month/9?params[]=apf&end_date=2017)

Of the 20 largest California wildfires in recorded history, 15 of them have occurred between 1999 and 2017. (578) In Alaska's boreal region wildfires have become more frequent since the 1980's, while also increasing in size and severity, and if this continues the fires could potentially outpace the ability of the forest to replenish itself. Between 2000 and 2016, Alaska wildfires burned more than 27,294,775 acres of land, (562) and although Alaska is vast at more than 375,000,000 acres in size, there have been major impacts to the environment. Not only do these enormous wildfires produce vast amounts of carbon when burning, but the heat also releases carbon and methane which is stored in the soils and permafrost, and Alaska alone is estimated to have between 37,000,000,000 and 76,900,000,000 metric tons of carbon stored in the soils and permafrost. (561) What would happen if the all permafrost throughout the world thaw as a result of global warming, and all this stored carbon and methane is released?



SOURCE: NASA - The fire situation in Alaska is very dynamic at this time. As of June 29, 2015, there are 314 active fires in the State. Many fires in remote areas are unstaffed. The fire summary for Alaska is as follows: 2 new fires with 11 acres burned, 42 staffed fires with 516,089 acres burned, and 271 monitored fires with 1,263,297 acres burned.

<https://www.nasa.gov/image-feature/goddard/unusually-large-number-of-fires-across-alaska>

Other Impacts

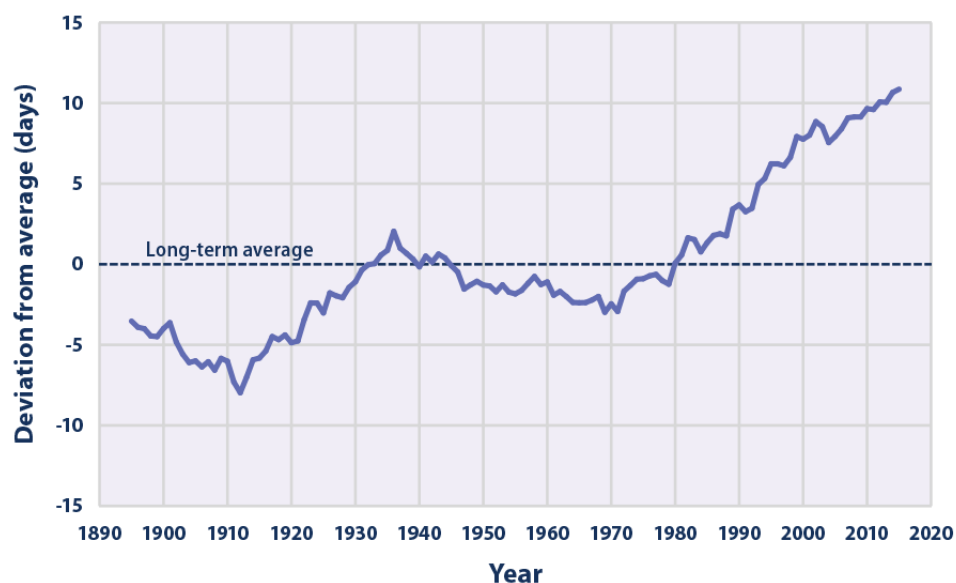
Global warming has altered the seasons of Earth, winters are shorter, summers are longer, and autumn and spring are extremely short, sometimes lasting only weeks now instead of months. These shorter winters and extended summers have made the grow season longer for many flora species, while also helping to create larger populations of some fauna species, as these species now have extended time for additional breeding opportunities and ample food resources, sometimes even year-round. Warmer temperatures at higher elevations have also impacted some species, ecosystems which were protected by the permanent cold are now warm at times making them potentially susceptible to changes. Global warming is changing the weather patterns of Earth, and as a result, many ecosystems throughout the world are now experiencing abnormal and rapid temperature fluctuations, extreme weather events, and increased or decreased precipitation.

Global warming will most likely affect many reptile and fish species which undergo temperature-dependent sex determination, possibly leading to extremely skewed sex ratios, and could perhaps lead to the extinction of some or even all of these species if the fragile ecosystem equilibrium is thrown too far out of balance. Many flora and fauna species can and will adapt, many species will undoubtedly migrate and even relocate, separate once unique ecosystems could amalgamate forming new types of ecosystems. Some species of florae and faunae will become more abundant, while other species will become sparse as Earth mitigates the effects of *Homo sapiens* depredations. Some species are extremely temperature sensitive and will either move to cooler areas or populations will begin to decline. American pikas are extremely temperature sensitive having a high body temperature, on average of around 104.18°F (40.1°C), and a relatively low upper lethal temperature, on average of 109.6°F (43.1°C). (71) As a reaction to global warming pikas have either moved to higher elevations, or they

have been extirpated from the ecosystem entirely due to ecosystem elevation limitations. A 2015 pika survey of 67 historical sites in California found that pikas no longer inhabit 15% of the sites. (502) Flying foxes in Australia are also extremely sensitive to elevated temperatures. Between 1994 and 2007, more than 30,000 flying foxes in Australia died from hyperthermia during 19 separate heat wave events, with similar mass die-offs also occurring in 2014, 2017, and 2018. (667)

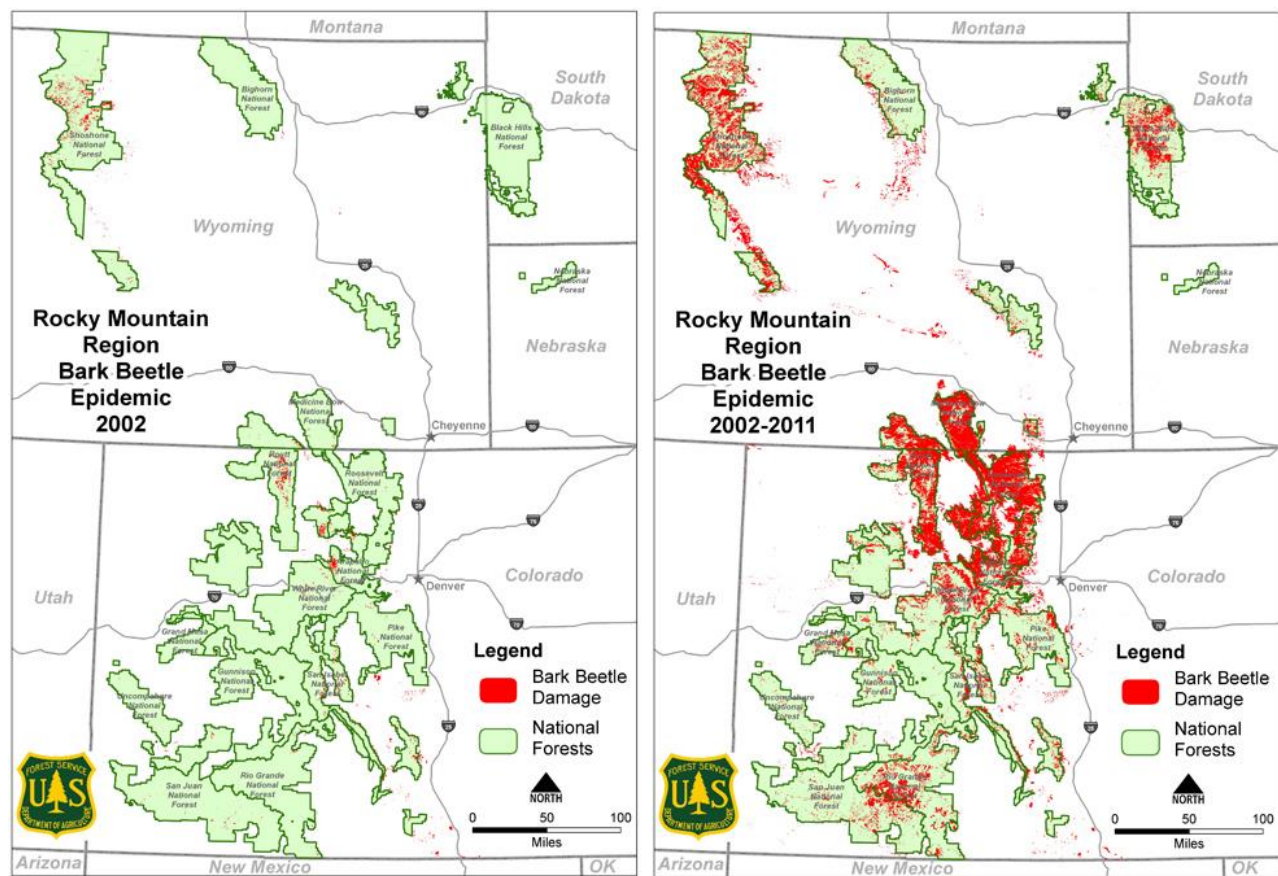
Nature is no doubt resilient and brilliant, and further evidence of this can be seen in how nature continuously evolves and how the Universe creates it from nothing, as demonstrated in the Miller–Urey experiment. The real question isn't if nature will survive, it is what will the Earth's ecosystems look like in 50 to 100 years from now or even 500 to 1,000 years in the future? Some flora and fauna species will thrive if temperatures continue to get warmer and winters become milder, ultimately allowing some species to form stable populations without going dormant. This could be a serious issue in the future for *Homo sapiens* with regard to fauna species like mosquitos, bark beetles, assassin bugs, and others, all of which the populations are kept in check with not only predators but with yearly climatic shifts to cold winter. Some species of flora and fauna can go dormant, or go into a suspended animation-like state allowing them to survive for long periods of time during climatic shifts and precipitation fluctuations. Mosses and lichens have been revived after being dormant for hundreds of years, microbes in Siberia have been revived after 30,000 years, (650) and a 1,300 year old aquatic flora species, *Nelumbo nucifera*, was germinated after being recovered from a dry lakebed in northeastern China. (11) Some of nature will simply just turn off and wait out the global warming storm, and those that can't may go extinct if they are impacted too severely.

The ecological responses to global warming have varied widely, some flora and fauna species have already begun to adapt to global warming with range shifts, community shifts, altering their migration patterns, and changing breeding cycles. Other temperature determinant qualities have all been observed in ecosystems throughout the world. Numerous flora species in Europe began flowering and leaf unfolding 1.4 to 3.1 days per decade earlier over the past 30 to 48 years. In North America over the last 35 to 65 years, numerous flora species also began flowering and leaf unfolding 1.2 to 2.0 (3.8) days per decade earlier. The European and New Zealand treelines have all advanced to higher altitudes. In the European Alps, alpine floras have had an elevational shift of 1 to 4 meters per decade, while Arctic shrub vegetation in Alaska has expanded to areas which were previously shrub-free. Liquid water availability and increased temperatures in Antarctica have led to distribution changes for Antarctic plants and invertebrates. (595)



SOURCE: EPA - Data source: Kunkel, 2016 - This figure shows the length of the growing season in the contiguous 48 states compared with a long-term average. For each year, the line represents the number of days shorter or longer than average. The line was smoothed using an 11-year moving average. Choosing a different long-term average for comparison would not change the shape of the data over time.

Over the past 30 to 60 years, numerous bird species in Europe and North America started earlier spring migration by 1.3 to 4.4 days per decade, and breeding by 1.9 to 4.8 days per decade. Over the last century Californian bird communities have advanced their breeding phenology by 5 to 12 days. (594) And over the past 23 years in the United Kingdom 18 butterfly species made earlier appearances by 2.8 to 3.2 days per decade. During the last 27 years, 39 butterfly species in North America and Europe have shifted their ranges northward up to 200 km. The red fox has expanded its range, while the Arctic fox range has shrunk. Some species have already experienced population increases because of global warming while other ecosystems have seen some localized populations extirpated. Ticks in the United States and bark beetle populations in the United States, Canada, and Mexico have expanded their ranges dramatically over the last 15 years wreaking havoc. In California, the USDA reported 66,000,000 trees died from 2010 to 2015 as a result of drought, warmer temperatures, and bark beetle infestation. (168) And the number of reported cases of Lyme disease has risen dramatically in the American Northwest and North Central United States where ticks have flourished the most.

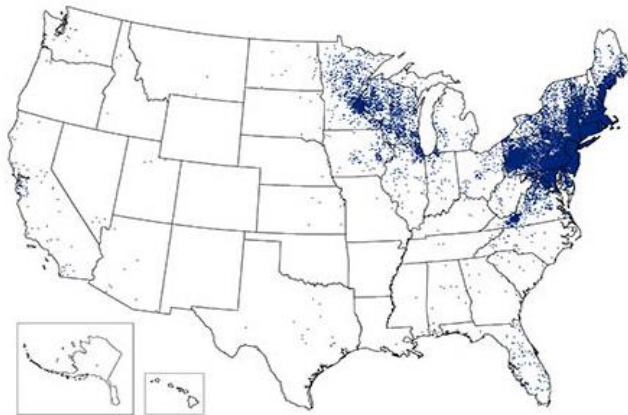


SOURCE: USDA Forest Service – The native mountain pine beetle *Dendroctonus ponderosae* has thrived as a result of global warming decimating millions of acres of forest from Mexico to Canada - <https://www.fs.usda.gov/main/barkbeetle/aboutepidemic/maps>

Reported Cases of Lyme Disease -- United States, 2001



Reported Cases of Lyme Disease -- United States, 2015



SOURCE: CDC Lyme Data and Statistics – Lyme disease has proliferated in the Northeastern United States over the last 15 years from an increased population of ticks which has occurred because of global warming - <https://www.cdc.gov/lyme/stats/index.html>

A 2015 study found that mass mortality events have been intensifying for birds, fishes, and marine invertebrates with the main causes being weather, thermal stress, disease, environmental contamination, and biotoxicity. (421) And a recent mass die-off of more than 200,000 saiga antelope was linked to climatic conditions. (471) While it must be remembered that anomalies do occur in nature, it is equally important to remember that anthropogenic activities can have a dramatic effect on the environment and cause naturally occurring anomalies to occur more frequently. Many anomalies in nature are now occurring more frequently (e.g. jellyfish blooms, algal blooms, extreme weather, etc.) and there is much scientific evidence that many of these anomalies are being influenced by anthropogenic activities. For instance, Algae blooms in recent years have been attributed to nitrogen and phosphorous runoff from agriculture. In August 2009, Angelique Chrisafis of The Guardian reported that toxic rotting green algae caused by high concentrations of pig, cattle and poultry farming in Brittany, France was affecting 70 beaches. Similar toxic algae have also been previous reported in Wales, and in New Zealand an unidentified toxic alga was blamed for two dog deaths on beaches in Auckland. (73) In August 2014, Reuters reported that a toxic algae bloom in Lake Erie, caused by nitrogen and phosphorous runoff from excessively fertilized fields and lawns, malfunctioning septic systems, and livestock, resulted in 500,000 residents without safe drinking water as even boiling the water does not destroy the toxic microcystins. (75) In late 2013 scientist detected an unusually large mass of warm water in the Pacific Ocean, it was named '*The Blob*' and it has persisted every year since, creating unusual weather and nutrient poor waters which adversely affects marine life like along the Alaskan and Canadian coasts. Where warmer waters helped to create a toxic algae bloom that contaminated krill and sardines ultimately killing 30 whales which consumed the them. (290) The Blob has nearly doubled in size each year from 500 miles wide, 500 miles long, 300 feet deep, to now more than 2000 miles wide, 2000 miles long, 300 feet deep, stretching from Alaska to Mexico. In November 2015 Kate Ramsayer and Carol Rasmussen of NASA reported that,

"Earth's oceans and land cover are doing us a favor. As people burn fossil fuels and clear forests, only half of the carbon dioxide released stays in the atmosphere, warming and altering Earth's climate. The other half is removed from the air by the planet's vegetation ecosystems and oceans.

As carbon dioxide levels in the atmosphere continue their rapid, human-made rise past levels not seen for hundreds of thousands of years, NASA scientists and others are confronted with an important question for the future of our planet: How long can this balancing act continue? And if forests, other vegetation and the ocean cannot continue to absorb as much or more of our carbon emissions, what does that mean for the pace of climate change in the coming century?"

"For most of human history, carbon has been in a more or less steady cycle. This cycle has been thrown off balance as people burn fossil fuels - carbon that has been long buried underground as oil, gas and coal - and as forests are cleared and soils are turned for agriculture. All of these contribute to increasing carbon emissions."

"More carbon in the atmosphere can act as a fertilizer and give vegetation a boost, increasing the storage of the greenhouse gas at least temporarily. But any increased plant growth due to more carbon dioxide in the air can't continue forever, researchers say. Eventually, the vegetation will run out of water or other nutrients necessary for enhanced growth. Without these essentials, vegetation can't keep taking up increasing amounts of greenhouse gases from human-caused emissions."

"In some regions, forests are releasing more carbon than they're storing. Satellite images have also documented the transition of green, healthy forests through land clearing and events like wildfires and insect infestations, which are increasing in drought-stressed environments. Droughts themselves slow down the growth of vegetation, slowing down the uptake of carbon in regions such as the Amazon. This can flip the balance for forests and other ecosystems - from an overall absorber of carbon to an overall emitter of the greenhouse gas. While natural climate variability may cause such year-to-year changes, scientists are concerned that climate change could turn forests into sources of carbon on a regular or even annual basis."

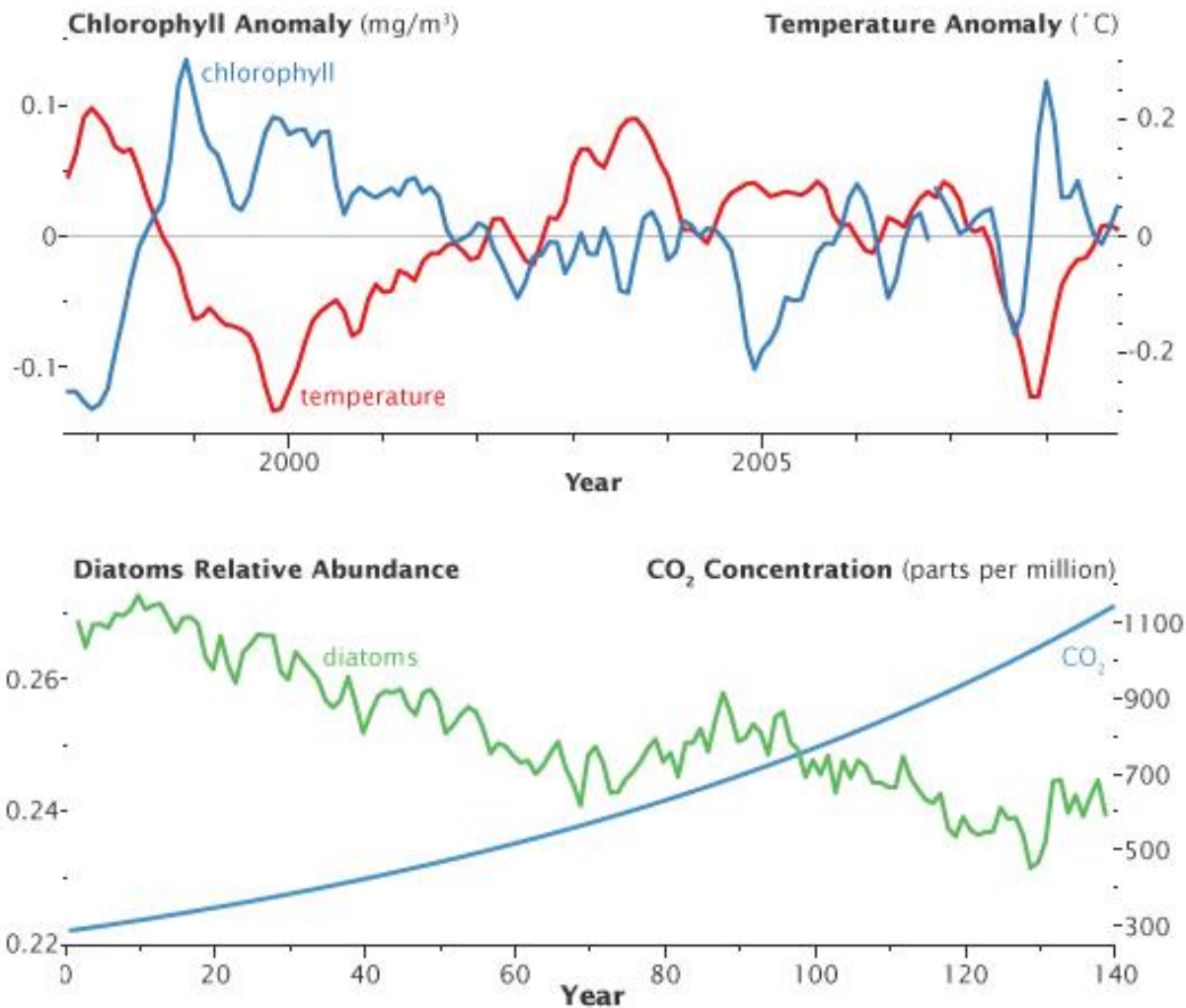
"Ocean scientists are facing similar questions about carbon. The ocean water itself absorbs carbon dioxide from fossil fuel emissions. Doing so, however, changes the chemistry of seawater. As surface water in the ocean continues to warm, uptake of carbon dioxide will slow down.

Oceans also contain carbon in the form of plants and animals, including phytoplankton - microscopic plants that take up carbon dioxide through photosynthesis, just like their larger, land-based cousins. Phytoplankton form the base of the ocean food web, and those that survive being eaten by zooplankton will die, sinking to the bottom of the ocean - taking their carbon stores with them to be decomposed. Changes to ocean chemistry and circulation due to climate change may alter this biological carbon pump, potentially triggering a release of the carbon stored deep in ocean sediments." (83)

Then in April 2016 NASA further reported that,

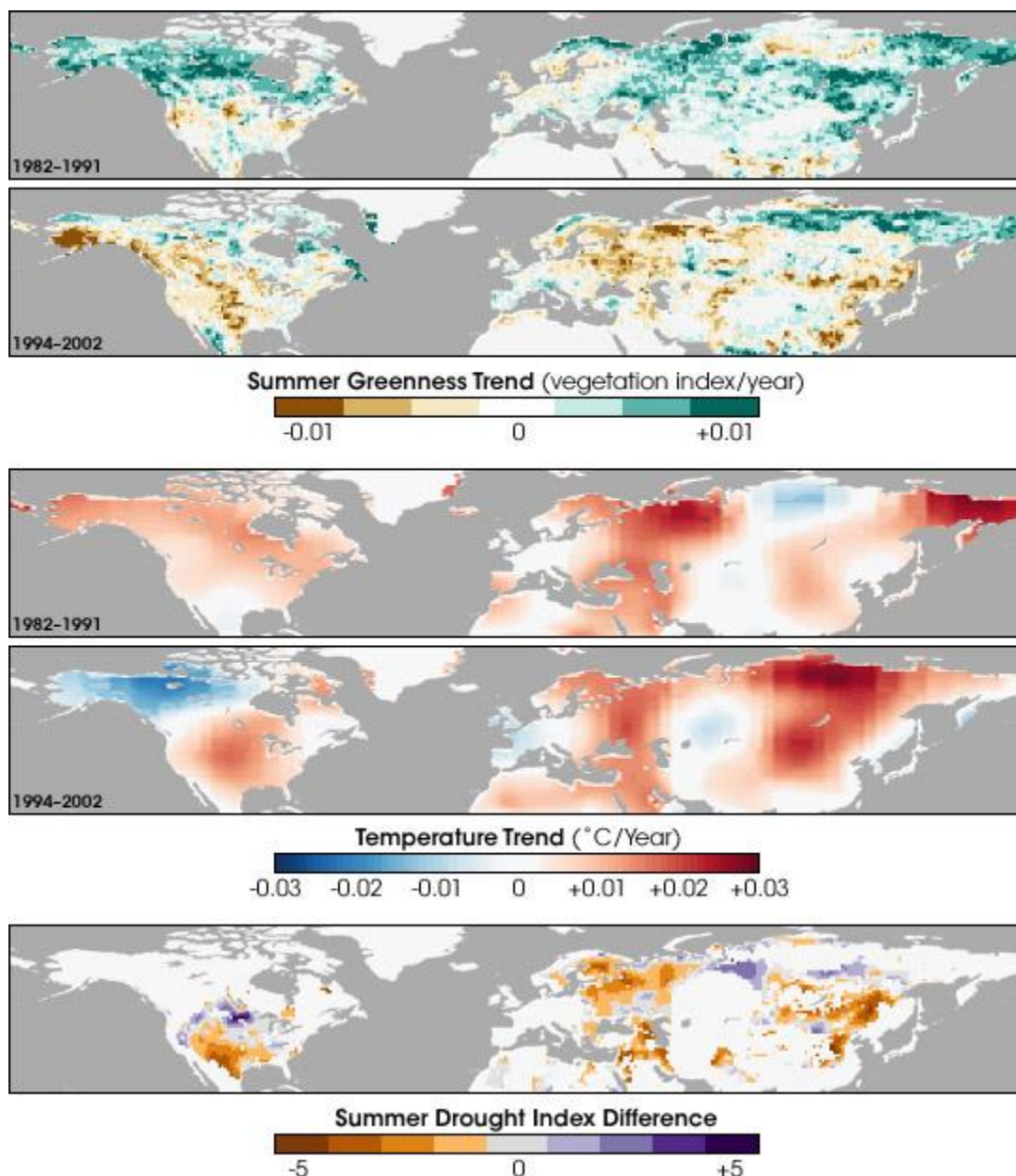
"From a quarter to half of Earth's vegetated lands has shown significant greening over the last 35 years largely due to rising levels of atmospheric carbon dioxide, according to a new study published in the journal *Nature Climate Change* on April 25. The greening represents an increase in leaves on plants and trees equivalent in area to two times the continental United States." (144)

Phytoplankton photosynthesis has controlled the balance of Earth's atmospheric carbon dioxide and oxygen for billions of years since early Precambrian. Throughout the history of the Earth, phytoplankton extinctions have coincided with similar periods which affected faunae and not terrestrial florae, as florae thrive on CO₂, ultimately leading to selective extinctions of some faunae. (659) Phytoplankton are responsible for producing half of Earth's oxygen, in addition to also absorbing CO₂ out of the atmosphere, and ultimately helping to naturally sequester it when they die and sink into the ocean depths. Phytoplankton are so abundant that they absorb 20% more carbon than all the forests on Earth. (660) Diatoms are one of the most common phytoplankton which perform this process, but in some marine ecosystems this is changing. In 2003, an organism never seen before in the Arabian Sea, called *Noctiluca scintillans* was documented, whereas previously diatoms dominated the Arabian Sea before 2000. This could lead to other repercussions, as zooplankton can eat diatoms, but not *Noctiluca scintillans* as they are too large. If zooplankton starve and die, larger organisms up the food chain could also be negatively impacted. (658) If there is a massive shift from diatoms to *Noctiluca scintillans* in marine ecosystems globally how much of an imbalance will this create in the carbon cycle?



SOURCE: NASA - About 70% of the ocean is permanently stratified into layers that don't mix well. Between late 1997 and mid-2008, satellites observed that warmer-than-average temperatures (red line) led to below-average chlorophyll concentrations (blue line) in these areas. (Graph adapted from Behrenfeld et al. 2009 by Robert Simmon.) As carbon dioxide concentrations (blue line) increase in the next century, oceans will become more stratified. As upwelling declines, populations of larger phytoplankton such as diatoms are predicted to decline (green line). (Graph adapted from Bopp 2005 by Robert Simmon.)
<https://earthobservatory.nasa.gov/Features/Phytoplankton/page5.php>

Scientists predicted that with the growing season longer, more carbon dioxide available, and increased temperatures boreal forests would be thriving, but they are not. Recent data analysis shows that the boreal forest may actually be in decline from lack of water caused by warmer longer summers which could actually be drying the trees. Although scientific theories originally predicted the boreal forests would, at some point in the future, run out of water and begin to decline, it is happening much sooner and more rapidly than what was previously thought.



SOURCE: NASA / Arctic temperatures warmed about 0.3°C over the past 25 years. During the initial decade of warming, boreal forests responded with vigorous growth. From 1994 to 2002, however, growth in many places slowed as temperatures climbed and the forest dried out. The maps above show trends in greenness, or growth (top pair), temperature (middle), and drought (bottom) from 1982-1991 and 1994-2002. In the earlier decade, increased growth (green) was linked to warmer temperatures (red) across most of the North. In the second decade, most of the area experienced poorer growth (brown) as temperatures rose. A cooling trend (blue) limited growth in Alaska during the latter decade, but the long-term trend in the area is a warming one. A Palmer drought index map shows areas that experienced drier (orange) or wetter (purple) summers. (Maps adapted from Angert et al. by Robert Simmon.)

Another possible impact from higher levels of carbon dioxide in the atmosphere could be on certain staple food crops like rice altering the protein, micronutrients, and vitamin content. Ultimately this would make them less nutritious and this could even have severe negative health consequences for billions of *Homo sapiens* that rely on these crops as a main food source. A study released in May 2018 stated,

"Declines of protein and minerals essential for humans, including iron and zinc, have been reported for crops in response to rising atmospheric carbon dioxide concentration, [CO₂]. For the current century, estimates of the potential human health impact of these declines range from 138 million to 1.4 billion, depending on the nutrient. However, changes in plant-based vitamin content in response to [CO₂] have not been elucidated. Inclusion of vitamin information would substantially improve estimates of health risks. Among crop species, rice is the primary food source for more than 2 billion people. We used multiyear, multilocation in situ FACE (free-air CO₂ enrichment) experiments for 18 genetically diverse rice lines, including

Japonica, Indica, and hybrids currently grown throughout Asia. We report for the first time the integrated nutritional impact of those changes (protein, micronutrients, and vitamins) for the 10 countries that consume the most rice as part of their daily caloric supply. Whereas our results confirm the declines in protein, iron, and zinc, we also find consistent declines in vitamins B1, B2, B5, and B9 and, conversely, an increase in vitamin E. A strong correlation between the impacts of elevated [CO₂] on vitamin content based on the molecular fraction of nitrogen within the vitamin was observed. Finally, potential health risks associated with anticipated CO₂-induced deficits of protein, minerals, and vitamins in rice were correlated to the lowest overall gross domestic product per capita for the highest rice-consuming countries, suggesting potential consequences for a global population of approximately 600 million." (136)

Other Factors - "known unknowns" and "unknown unknowns"

Many things can affect the climate, temperatures, and heat retention of Earth. Changes in snow and ice cover, and even clouds or cloud types can change the planet's reflective capacity of sunlight. Aerosols in the atmosphere produced by volcanoes and anthropogenic activities can reflect sunlight and cause a '*Global Dimming*' or cooling effect like that seen between 1961 and 1990. Or in the 1991 eruption of Mount Pinatubo, which resulted in a large stratospheric injection of aerosols and dust which reduced the amount of sunlight reaching Earth by roughly 10%, and thus cooling global temperatures over the next 2 years. Anthropogenic sources which generate additional heat, from automobiles to laptop computers, and other sources which retain heat like buildings, could also either increase or decrease global temperatures depending on how eco-friendly they are designed. (e.g. if all automobiles are electric in the next 50 years, there would be the obvious elimination of the heat trapping carbon, but how much less heat would also be generated from a cooler electric engine?)

Due to thermal inertia, even when and if fossil fuels are eliminated and greenhouse gas emissions decrease, the temperature of Earth is predicted to continue rising and not stabilize for 100-500 years, perhaps even more with feedback effects. Therefore, it is so important not to emit any greenhouse gases, no amount is tolerable or environmentally acceptable, and any amount emitted from this point forward could hinder this temperature stabilization process even further. If coal is no longer used, and these particles are no longer emitted which reflect some sunlight, will this possibly cause a temporary rapid heating effect? If climatic weather patterns shift and a desert which only receives 10 inches or less rainfall per year suddenly gets 30 or 60 inches of rainfall per year, how will this affect flora and fauna species that have evolved and adapted for millions of years to a desert ecosystem? How badly would this increase in rainfall quickly erode a desert landscape like that in Utah, Arizona, and Nevada? If a forested region of the Rocky Mountains receives little or no snow at all and the streams and rivers dry up thus turning it into a high desert how many flora and fauna species would perish as a result?

Planet Earth's climate has changed rapidly and dramatically over the last 75 years in response to the destructive anthropogenic activities which continue to occur. How much more will the Earth's climate continue to change? Could these reactions from Earth be an attempt to correct and find a balance to anthropogenic activities? It has also been hypothesized that global warming may reach a tipping point, and further warming may be caused by positive feedback effects. (e.g. if the Earth heats up enough to melt the tundra regions of Earth, in theory mass quantities of methane would then be released and cause a runaway global warming effect) Could anthropogenic activities warm the Earth several degrees lasting 200,000 years or more, similar to what happened during the Paleocene-Eocene Thermal Maximum? Once the tipping point is reached, even mass reductions in anthropogenic greenhouse gas emissions will make no difference in reversing the changes quickly enough, and *Homo sapiens* will just be along for the ride so to speak.

CHAPTER V.

Frankenstein Science and Attempting to Play God

***Homo sapiens* Clash with Nature**

In the past, and even today, some scientists and their gullible followers seem like a mirror image of '*PINKY and the BRAIN*'. Exercising Godlike powers without Godlike wisdom is perhaps one of the most foolish acts *Homo sapiens* have done thus far during their brief existence on Earth. Would the world not perhaps be better off if those with a Godlike mentality or anyone wishing to even explore Godlike powers, refrained from being a scientist and perhaps wrote fiction instead? Using science and technology to observe and understand how the universe works is a worthy pursuit of knowledge, but when that science and knowledge are used in a negative manner to manipulate things which should not be manipulated, it will most often have very devastating consequences.

Nature is like every other great thing in demand, *Homo sapiens* try to own it, but nature will never be owned by anything, as it is nature and it will continue to evolve freely. Manipulation of nature through technology is not the way to coexist or understand the natural world. *Homo sapiens* have barely even begun to understand the Earth and life, shouldn't *Homo sapiens* study and fully understand the Earth and life itself before they attempt to manipulate and control it? Is experimental Frankenstein science really necessary in order to gain useful knowledge? Could observation, mathematics, and technology not definitively prove most things? Why do so many experimental scientists have a God complex? Al Gore wrote,

"But we have overestimated our own omniscience and underestimated the complexity and subtlety of the natural system with which we are interfering."

"...we have assumed that our lives need have no real connection to the natural world, that our minds are separate from our bodies, and that as disembodied intellects we can manipulate the world in any way we choose. Precisely because we feel no connection to the physical world, we trivialize the consequences of our actions."

"Something like this has happened in our relationship to nature. The more we rely on technology to mediate our relationship to nature, the more we encounter the same trade-off: we have more power to process what we need from nature more conveniently for more people but the sense of awe and reverence that use to be present in our relationship to nature is often left behind. This is the primary reason that so many people now view the natural world merely as a collection of resources; indeed, to some people nature is like a giant data bank that they can manipulate at will."

"We have also fallen victim to a kind of technological hubris, which tempts us to believe that our new powers may be unlimited. We dare to imagine that we will find technological solutions for every technologically induced problem. It is as if civilization stands in awe of its own technological prowess, entranced by the wondrous and unfamiliar power it never dreamed would be accessible to mortal man. In a modern version of the Greek myth, our hubris tempts us to appropriate for ourselves-not from the gods but from science and technology-awesome powers and to demand from nature godlike privileges to indulge our Olympian appetite for more. Technological hubris tempts us to lose sight of our place in the natural order and believe that we can achieve whatever we want.

And, far too often, our fascination with technology displaces what used to be a fascination with the wonder of nature...we ask civilization for more of everything we want while ignoring the stress and strain tearing at the fabric of the natural system...Thus, as we focus our attention more and more on using technological processes to meet our needs, we numb the ability to feel our connection to the natural world."

"...technology has vastly magnified our various abilities to manipulate nature far beyond the extent to which it has thus far magnified our abilities to conserve and protect nature. We now have a thousand incredibly powerful new ways to manipulate and transform the natural systems of our fragile earth, but our notions of how to consolidate and protect the environment against unintended consequences are still rudimentary. And our reckless manipulations of nature are far more likely to have a catastrophic collateral damage precisely because we have failed to think of how to safeguard the stability and continuity of their context...In the later half of this century, for example, we have manipulated nature in unheard of ways and then, as problems have resulted, we have reflexively looked for still more ways to manipulate nature in hopes of fixing the damage from the initial intervention." (276)

Homo sapiens seem determined to fight against nature and will even attempt to use Frankenstein science in an effort to fix the problems, problems which most of the time are a result of *Homo sapiens* actions. Instead of

fighting an endless battle with nature using science and technology, perhaps *Homo sapiens* would have better results if they coexisted with nature, working with nature instead of against it. Nature surely has more experience, adaptability, and processes, some of which are perhaps still unknown, this has been demonstrated in numerous instances when nature has rapidly evolved to resist pesticides, antibiotics, vaccines, or when existing in a toxic environment created by anthropogenic activities. Richard Leakey and Roger Lewin wrote,

“It is far better to understand and accept the world of nature in its infinite variety and its infinitely complex processes, acknowledging the near futility of attempts to control them, than to imagine through ignorance that it is possible to do so.” (606)

No matter how much *Homo sapiens* attempt to alter Earth, but instead only leave their scars upon its once virgin surface, nature will always continue to exist in some form, and it will always be nature and not *Homo sapiens* which govern the stage that the game of life is played on, be it here on Earth or the entire Universe itself. *Homo sapiens* can depredate the Earth endlessly and nature will always find a way of making its presence known, for nature has been playing the game of life far longer than *Homo sapiens*, and it is the master of the game as it invented it. Keeping this in mind, would it not be more logical for *Homo sapiens* to coexist with nature instead of fighting with it and attempting to control, change, or exterminate it? Nature is perfect in every way, and it was all created without a laboratory, synthetic chemicals, money, government, or any outside intervention by *Homo sapiens*. Nature is flawless, everything that it does be it diseases, natural disasters, and other processes implemented which *Homo sapiens* do not condone or understand, are done as a logical reaction or process which creates a natural balance. Charles Darwin wrote,

“It is most difficult always to remember that the increase of every living being is constantly being checked by unperceived injurious agencies...” (17)

Would not learning and understanding the rules of nature and following these rules as a guide instead of attempting to control and rewrite the laws of nature benefit *Homo sapiens* far more? If *Homo sapiens* continue to battle against nature could they ultimately destroy themselves with the same science and technology that it thinks is so helpful. Ina Corrine Brown remarked that,

“The Hopi way is a way of cooperation of man with man and man with nature, competition as we know it is alien to their whole system of values.” (24)

Earth does not get nearly enough credit when it comes to its phenomenal natural power of healing itself. To be made with such perfection the Earth surely has many safeguards and contingencies to protect itself and deal with any possible scenario in the universe be it an extraterrestrial object impact or the careless actions of *Homo sapiens*, and even if that contingency plan is extinction for *Homo sapiens* Earth, life, and evolution will certainly continue. The Sun which fuels it in so many ways will also help to heal Earth in time, and if the Earth is given the respect it so much deserves, Earth can adapt to and even reverse some of *Homo sapiens* depredations, but Earth must be left alone and allowed time to heal.

There was massive devastation done during World War I and World War II to the florae and faunae of Europe and in the Pacific, yet in less than 75 years it has rebounded dramatically. Bikini Atoll, where 23 nuclear tests were conducted in the 1940s and 1950s, has recovered for the most part, and although the groundwater is still contaminated and coconuts are radioactive wildlife appears to still be thriving. (386) Even more rapid recovery can be seen in natural disasters like the Mount St. Helens volcano, or impacted areas of hurricanes. One need not forget that nature is flawless, and when there an imbalance it is corrected one way or another, and the entire system becomes balanced again without any interaction from *Homo sapiens*. This current imbalance which *Homo sapiens* are creating will either be corrected by *Homo sapiens* themselves, or nature will perhaps bring balance through the extinction of *Homo sapiens*. If *Homo sapiens* fix themselves and leave nature alone, then nature will fix everything else and the Earth will balance itself out. Interfering with natural processes and attempting to control Earth is not the answer to the issues, the answer is coexistence. In his book ‘*Another Roadside Attraction*’ Tom Robbins wrote,

“...“I shall determine how to prolong the lives of butterflies,” she had previously announced. However, an hour later when she

awoke, she smiled mysteriously. "The life-span of the butterfly is precisely the right length," she said." (669)

Nature, as it always has in times of the past, will balance itself out in one way or another and anything *Homo sapiens* do will most likely not change this, no matter the known technology *Homo sapiens* use in an attempt to change and control Earth. For it is often forgotten that *Homo sapiens* are not Gods or the masters of their domain, but simply another small part of it, and that nothing in the universe lasts forever, no species will remain dominant forever as history has shown, and those which coexist will be around far longer. Using science and technology to try and fix problems in nature caused by *Homo sapiens* depredations could cause even more problems. Perhaps if *Homo sapiens* simply fix their lifestyles and let Earth fix itself, things would be much better.

A false assumption that many *Homo sapiens* have made, is living based on the illogical fallacy that *Homo sapiens* can control and change the world with the Godlike powers which they have discovered through science and technology. One can easily see through this illogical fallacy if they simply look at the universe and the Earth itself and how perfect functions and how it has evolved for billions of years. The universe was created with in a scientifically brilliant manner, and is based on a perfectly balanced formula. And to doubt, ignore, or go against this formula could be the fatal mistake of *Homo sapiens*, whereas to confirm, acknowledge, and coexist with the formula could inevitably insure a prosperous utopian future. Given that there are so many unknown variables and considering the destructive past and present of *Homo sapiens* is it the wisest choice to attempt to play God with science and technology?

Is science a blessing or a curse to *Homo sapiens*? One could say without a doubt that without science *Homo sapiens* would have far less comforts, answers, no cures to diseases, and there would be far fewer *Homo sapiens* populating Earth. But some science has also brought about destruction in many ways like weapons used in wars, synthetic chemicals made in a laboratory unknown to *Homo sapiens* 100 years ago, now pollute Earth. Science can be good only if it is thoroughly contemplated, used responsibly, and abandoned if found to be negative. *Homo sapiens* appear to be obsessed with not only manipulating *Homo sapiens*, but everything in the world around them.

If *Homo sapiens* continue down their current negative path in certain areas of science, and do not incorporate more respect for nature and the scientific brilliance which is being witnessed, in all areas of science, then there will most likely always be a clash with science and nature. One does not need to attempt to play God with science in order to figure out the mysteries of the Universe. Truly scientifically minded *Homo sapiens*, utilizing the tools of thought and observation, can see the scientific brilliance which make the universe possible, and not by utilizing the methods of experimentation and manipulation. The Universe is scientific perfection, created with everything needed to sustain and maintain life, while at the same time not using any of the negative things invented by *Homo sapiens*. (e.g. *Homo sapiens* have invented a wide range of synthetic chemicals which never existed on Earth until around 75 years ago, and possibly nowhere in the Universe itself, until *Homo sapiens* experimented and manipulated chemistry)

***Homo sapiens* Evolutionary Influence**

Some *Homo sapiens* are seeking knowledge about the meaning of life in trying to reverse engineer the universe. It is almost like instead of starting at the beginnings of the book of knowledge, which is the perfection of nature, *Homo sapiens* are flipping through the book and selecting topics at random. One of the issues with this, is that one needs to read the book in order from beginning to end in order to gain full understanding and responsibility. Should not a responsible moral scientist know indubitably that the science which is being pursued or carried out does not have negative consequences on Earth, and does not alter *Homo sapiens* in such a way negative way as to change their evolutionary course and ultimate future?

Genetically modified organisms, selective breeding, and mutation breeding are unnatural, and will only cause further separation from true nature. Speeding up the process of evolution could have devastating consequences and have impacts throughout the chain of life. Billions of years of historical evolutionary evidence has shown

that nature has a far better engineering plan than *Homo sapiens* who attempt to compete with it. One could also say that some secrets are meant for keeping, and nature will never reveal all of the secrets which it holds. Some are even of the opinion that *Homo sapiens* should not treat diseases of affluence nor any diseases at all and allow evolution to take its course letting the diseases wipe out the afflicted, and thus allowing survival of the fittest. Has medicine and technology created an evolutionary bottleneck or will medical and technological innovations eventually help to determine *Homo sapiens* evolutionary path, perhaps creating a future of genetically modified and medically flawless *Homo sapiens* which never get sick and possibly have an average lifespan of 500 years or more? What does it say about *Homo sapiens* when they have created a doomsday conservancy seed bank to store flora seeds in case of an asteroid impact, genetics gone wrong, pestilence, or other anthropogenic influences? Just being prepared? Or have things gotten so bad that *Homo sapiens* must now have a perhaps useless contingency plan to try and fix Earth when and if it is ultimately destroyed from *Homo sapiens* depredations. Do *Homo sapiens* have the knowledge to fix Earth if nature collapsed? Will simply flora seeds and the partial knowledge *Homo sapiens* have learned about the engineering and mechanics of nature be enough to restart the Earth or bring floras back from the brink of extinction?

Some believe that *Homo sapiens* were created on Earth and given the powers of God to experiment with, they view life as some sort of challenge to try and figure out how it was all created and works, in order to only manipulate it. Through scientific experiment and manipulation is how you will find the meaning of life they say, but just because one finds God's chemistry set, so to speak, doesn't mean they should attempt to play God with the chemistry set, especially when they do not know what they are doing and what their actions can possibly do in the future.

When it comes to science perhaps one should first ask the questions, was the scientific research worth the means to acquire the knowledge? Did that acquired knowledge help to accomplish anything or just prove the point of the scientist theory with a needless experiment? Does the science alter things in any form so as to give the scientist the powers of God? Should you be playing God with the world you know so little about, and more importantly is it yours to play God with? You didn't make Earth, in fact you are part of the Earth, so why would you intentionally do something to possibly hurt yourself? You can never attempt to play God and change nature to your liking, it is a fragile and delicately balanced system that has evolved perfectly for billions of years. Just because you have been given the power or ability to do something doesn't mean you should do it. Science should be used as the method for understanding nature and the universe, not utilized to engage in futile attempts to reinvent and control it.

An argument could be made, that all the elements were created in the universe, and that if it were not supposed to be used, then the elements and combined possibilities wouldn't even exist in the first place. But this attitude is an ignorant and illogical one. If the entire scope of things effected by the actions of something are not carefully studied, then there could be unforeseen consequences. Take plastic for instance, one could argue it is so beneficial to *Homo sapiens* and without it the world would not currently be as advanced as it is. But if someone were to have had the forethought when plastic was invented to realize that it is unnatural and detrimental to the Earth's ecosystems, and perhaps if this type of logical thought would have prevailed, toxic plastic would have never been used, and perhaps an alternative more natural type of plastic from floras, stone, or other biodegradable material would have been pursued instead.

Naturalist Versus the Frankenstein Scientist

Why can't Frankenstein scientists be more respectful towards the perfectly functioning system of nature, and instead use science in conjunction with nature? Would it have been possible to make the same progress in science using natural based materials versus synthetics? Was all the progress made at the cost of destroying Earth worth it? Could *Homo sapiens* have progressed differently in a more natural way versus the synthetic path which was taken? Or was it for a necessary part of *Homo sapiens* evolution and more importantly their survival? Is the destruction of Earth nothing more than *Homo sapiens* evolving? Perhaps *Homo sapiens* must destroy Earth in order to learn from the mistake, but judging by history, it appears *Homo sapiens* have continued the same cycle of parasitic destruction to Earth, and even to its own species, and has learned very little. Does one really

have to make the mistake before they know it is wrong, or is all that's required to see the error which awaits is forethought, imagination, and logical thinking? Perhaps it is more that moral standards are lacking in certain circles of not only the general population, but more especially in the scientific community which has more control over the advancement and direction in which to proceed. Playing God and doing anything you want will give anyone a '*God Complex*' as a result of tampering with things that are not meant to be altered. Being able to manipulate the environment around you does not make them more intelligent, it makes them less harmonic with the natural world around them, and it often gives one the mentality that they can control and manipulate the world instead of coexisting within it. Some see *Homo sapiens* as special and separate from the rest of the natural world, and they think that everything on Earth was put here to be exploited, but this is far from the truth and is a very narcissistic way of thinking about *Homo sapiens*.

Attaching cameras, radio collars, GPS trackers, and other sensors to faunae is not science, it is simply another form of exploitation, and many are lost and end up polluting an ecosystem. So many Frankenstein scientists invade ecosystems in the name of science, bringing with them plastic gadgets and bright lights, but these scientists have more of an obsession with the species and only want to dissect and morbidly experiment on the species. Instead of dissecting nature and saying here is how it works, perhaps *Homo sapiens* should be observing nature more from a distance, and simply observe it to gain a better understanding of it. It is already perfection, you cannot mimic this or attempt to change it, so don't even try, simply respect it and observe it. Trying to find out the meaning of life through dissection and the manipulation of life could lead to unforeseen consequences an ultimately disaster.

You can study nature from a distance and without touching or altering it, and most all Frankenstein experimentation, manipulation, and dissection are often unnecessary to find scientific answers. Nature functions perfectly and it has become this way through the laws of evolution, and no matter what is done to nature the natural process of evolution will always win. So why even attempt to change it or try to make it any better? The first scientists thousands of years ago were observers and theorists, not Frankenstein scientists, and they created the foundations for natural history, which is the study of flora and fauna in their natural environment with an emphasis on observational versus experimental study methods. One who studies natural history is a naturalist. Perhaps the Earth would be far better off if there were more naturalists and less experimental scientists. Jean-Henri Fabre wrote,

"And then, my dear insects, if you cannot convince those good people, because you do not carry the weight of tedium, I, in my turn, will say to them: 'You rip up the animal and I study it alive; you turn it into an object of horror and pity, whereas I cause it to be loved; you labor in a torture chamber and dissecting room, I make my observations under the blue sky to the song of the cicadas, you subject cell and protoplasm to chemical tests, I study instinct in its loftiest manifestations; you pry into death, I pry into life. And why should I not complete my thought: the boars have muddied the clear stream; natural history, youth's glorious study, has, by dint of cellular improvements, become a hateful and repulsive thing. Well, if I write for men of learning, for philosophers, who, one day, will try to some extent to unravel the tough problem of instinct, I write also, I write above all things for the young. I want to make them love the natural history which you make them hate; and that is why, while keeping strictly to the domain of truth, I avoid your scientific prose, which too often, alas seems borrowed from some Iroquois idiom.'"

"I am not at all an experienced and, still less, a zealous hunter, for the insect interests me much more when engaged in its work than when struck on a pin in a cabinet." (628)

Some of the Unethical and Controversial Frankenstein Science Conducted	
Name	Description
J. Marion Sims Gynecological Experiments	Throughout the 1840s, J. Marion Sims, who is often referred to as "the father of gynecology", performed surgical experiments on enslaved African women, without anesthesia. The women—one of whom was operated on 30 times—eventually died from infections resulting from the experiments. In order to test one of his theories about the causes of trismus in infants, Sims performed experiments where he used a shoemaker's awl to move around the skull bones of the babies of enslaved women. He also addicted the women in his surgical experiments to morphine, only providing the drugs after surgery was already complete, in order to make them more compliant.
Child Spinal Tap Experiments	In 1896, Dr. Arthur Wentworth performed spinal taps on 29 young children, without the knowledge or consent of their parents, at the Children's Hospital in Boston, Massachusetts to discover whether doing so would be harmful.
San Quentin Prison Testicle	From 1913 to 1951, Dr. Leo Stanley, chief surgeon at the San Quentin Prison, performed a wide variety

Experiments	of experiments on hundreds of prisoners at San Quentin. Many of the experiments involved testicular implants, where Stanley would take the testicles out of executed prisoners and surgically implant them into living prisoners. In other experiments, he attempted to implant the testicles of rams, goats, and boars into living prisoners. Stanley also performed various eugenics experiments, and forced sterilizations on San Quentin prisoners. Stanley believed that his experiments would rejuvenate old men, control crime (which he believed had biological causes), and prevent the "unfit" from reproducing.
Filipino Cholera Experiments	In 1906, Professor Richard Strong of Harvard University intentionally infected 24 Filipino prisoners with cholera, which had somehow become contaminated with plague. He did this without the consent of the patients, and without informing them of what he was doing. All of the subjects became sick and 13 died.
Orphaned Children Tuberculin Experiments	In 1908, three Philadelphia researchers infected dozens of children with tuberculin at the St. Vincent's House orphanage in Philadelphia, causing permanent blindness in some of the children and painful lesions and inflammation of the eyes in many of the others. In the study, they refer to the children as "material used".
Orphaned Children Wart Experiments	In 1909, F. C. Knowles released a study describing how he had deliberately infected two children in an orphanage with Molluscum contagiosum—a virus that causes wart like growths—after an outbreak in the orphanage, in order to study the disease.
Noguchi Syphilis Experiments	In 1911, Dr. Hideyo Noguchi of the Rockefeller Institute for Medical Research injected 146 hospital patients (some of whom were children) with syphilis. He was later sued by the parents of some of the child subjects, who allegedly contracted syphilis as a result of his experiments.
Voronoff Monkey Testicle Experiments	<p>Serge Abrahamovitch Voronoff was a French surgeon of Russian extraction who gained fame for his technique of grafting monkey testicle tissue on to the testicles of men for purportedly therapeutic purposes while working in France in the 1920s and 1930s. Voronoff's experiments launched from this starting point. He believed glandular transplants would produce more sustained effects than mere injections. Voronoff's early experiments in this field included transplanting thyroid glands from chimpanzees to humans with thyroid deficiencies. He moved on to transplanting the testicles of executed criminals into millionaires, but, when demand outstripped supply, he turned to using monkey testicle tissue instead.</p> <p>Between 1917 and 1926, Voronoff carried out over five hundred transplantations on sheep and goats, and also on a bull, grafting testicles from younger animals to older ones. Voronoff's observations indicated that the transplantations caused the older animals to regain the vigor of younger animals. He also considered monkey-gland transplantation an effective treatment to counter senility.</p> <p>By the early 1930s, over 500 men had been treated in France by his rejuvenation technique (including Voronoff's younger brother Georges), and thousands more around the world, such as in a special clinic set up in Algiers. To cope with the demand for the operation, Voronoff set up his own monkey farm on the Italian Riviera, employing a former circus-animal keeper to run it. Voronoff's later work included transplants of monkey ovaries into women. He also tried the reverse experiment, transplanting a human ovary into a female monkey, and then tried to inseminate the monkey with human sperm.</p>
Brinkley Goat Testicle Experiments	<p>John Romulus Brinkley was an American who fraudulently claimed to be a medical doctor (he had no legitimate medical education and bought his medical degree from a "diploma mill") who became known as the "goat-gland doctor" after he achieved national fame, international notoriety and great wealth through the xenotransplantation of goat testicles into humans. Although initially Brinkley promoted this procedure as a means of curing male impotence, eventually he claimed that the technique was a virtual panacea for a wide range of male ailments. He operated clinics and hospitals in several states, and despite the fact that almost from the beginning, detractors and critics in the medical community thoroughly discredited his methods, he was able to continue his activities for almost two decades.</p> <p>As recounted in the biography that Brinkley had commissioned, he struck upon the idea of transplanting goat testicles into men when a patient came to him to ask if he could fix someone who was "sexually weak". Brinkley responded by joking that the patient would have no problem if he had "a pair of those buck [goat] glands in you". The patient then begged Brinkley to try the operation, which Brinkley did, for \$150. (The patient's son later told The Kansas City Star that Brinkley had in fact offered to pay his father "handsomely" if he'd go along with the experiment.)</p> <p>At his clinic, Brinkley began to perform more operations he claimed would restore male virility and fertility through implanting the testicular glands of goats in his male patients at a cost of \$750 per operation (\$9,000 in current value). Following one of his crude operations, the body of a patient would typically absorb the goat gonads as foreign matter. The organs were never accepted as part of the body since they were simply placed into the human male testicle sac or the abdomen of women, near the ovaries. Unsurprisingly, in light of his questionable medical training (75 percent completion at a less-than-reputable medical school), frequency of operating while intoxicated and less-than-sterile operating</p>

	<p>environments, some patients suffered from infection, and an undetermined number died. Brinkley would be sued more than a dozen times for wrongful death between 1930 and 1941.</p> <p>Soon after Brinkley opened up shop, he scored an advertising coup that made major newspapers come calling: the wife of his first goat gland transplantation patient gave birth to a baby boy. Brinkley began promoting goat glands as a cure for 27 ailments, ranging from dementia to emphysema to flatulence. He started a direct mail blitz and hired an advertising agent, who helped Brinkley portray his treatments as turning hapless men into "the ram that am with every lamb". His burst of publicity—and his stratospheric claims—attracted the attention of the American Medical Association, which sent an agent to the clinic to investigate undercover. The agent found a woman hobbling around Brinkley's clinic who had been given goat ovaries as a cure for a spinal cord tumor. From then on, Brinkley was on the AMA's radar, including catching the eye of the doctor that would eventually be responsible for his downfall, Morris Fishbein, who made his career exposing medical frauds.</p>
Delgado Electrical Mind Control Experiments	<p>José Manuel Rodríguez Delgado was famed for his research on mind control through electrical stimulation of the brain. Rodríguez Delgado's research interests centered on the use of electrical signals to evoke responses in the brain. His earliest work was with cats, but he later did experiments with monkeys and humans, including psychiatric patients.</p> <p>Much of Rodríguez Delgado's work was with an invention he called a stimoceiver, a radio which joined a stimulator of brain waves with a receiver which monitored E.E.G. waves and sent them back on separate radio channels. The stimoceiver could be used to stimulate emotions and control behavior. According to Rodríguez Delgado, "Radio Stimulation of different points in the amygdala and hippocampus in the four patients produced a variety of effects, including pleasant sensations, elation, deep, thoughtful concentration, odd feelings, super relaxation, colored visions, and other responses." Rodríguez Delgado stated that "brain transmitters can remain in a person's head for life. The energy to activate the brain transmitter is transmitted by way of radio frequencies."</p> <p>Using the stimoceiver, Rodríguez Delgado found that he could not only elicit emotions, but he could also elicit specific physical reactions. These specific physical reactions, such as the movement of a limb or the clenching of a fist, were achieved when Rodríguez Delgado stimulated the motor cortex. A human whose implants were stimulated to produce a reaction were unable to resist the reaction and so one patient said, "I guess, doctor, that your electricity is stronger than my will". Some consider one of Rodríguez Delgado's most promising finds is that of an area called the septum within the limbic region. This area, when stimulated by Rodríguez Delgado, produced feelings of strong euphoria. These euphoric feelings were sometimes strong enough to overcome physical pain and depression.</p> <p>In Rhode Island, Rodríguez Delgado did some work at what is now a closed mental hospital. He chose patients who were "desperately ill patients whose disorders had resisted all previous treatments" and implanted electrodes in about 25 of them. Most of these patients were either schizophrenics or epileptics. The most famous example of the stimoceiver in action occurred at a Córdoba bull breeding ranch. Rodríguez Delgado stepped into the ring with a bull which had had a stimoceiver implanted within its brain. The bull charged Delgado, who pressed a remote-control button which caused the bull to stop its charge. Always one for theatrics, he taped this stunt and it can be seen today. The region of the brain Rodríguez Delgado stimulated when he pressed the hand-held transmitter was the caudate nucleus. This region was chosen to be stimulated because the caudate nucleus is involved in controlling voluntary movements. Rodríguez Delgado claimed that the stimulus caused the bull to lose its aggressive instinct.</p>
Tuskegee Syphilis Experiment	<p>The Tuskegee Study of Untreated Syphilis in the Negro Male, also known as the Tuskegee Syphilis Study or Tuskegee Syphilis Experiment was an infamous clinical study conducted between 1932 and 1972 by the U.S. Public Health Service. The purpose of this study was to observe the natural progression of untreated syphilis in rural African-American men in Alabama under the guise of receiving free health care from the United States government. The Public Health Service started working on this study in 1932, in collaboration with Tuskegee University, a historically black college in Alabama. Investigators enrolled in the study a total of 600 impoverished, African American sharecroppers from Macon County, Alabama. Of these men, 399 had previously contracted syphilis before the study began, and 201 did not have the disease. The men were given free medical care, meals, and free burial insurance for participating in the study. After funding for treatment was lost, the study was continued without informing the men they would never be treated. None of the men infected were ever told they had the disease, and none were treated with penicillin even after the antibiotic was proven to successfully treat syphilis. According to the Centers for Disease Control, the men were told they were being treated for "bad blood", a local term for various illnesses that include syphilis, anemia, and fatigue. The 40-year study was controversial for reasons related to ethical standards. Researchers knowingly failed to treat patients appropriately after the 1940s validation of penicillin was found as an effective cure for the disease they were studying. Revelation in 1972 of study failures by a whistleblower led to major changes in U.S. law and regulation on the protection of participants in</p>

	<p>clinical studies. Now studies require informed consent, communication of diagnosis, and accurate reporting of test results. By 1947, penicillin had become the standard treatment for syphilis. Choices available to the doctors involved in the study might have included treating all syphilitic subjects and closing the study, or splitting off a control group for testing with penicillin. Instead, the Tuskegee scientists continued the study without treating any participants; they withheld penicillin and information about it from the patients. In addition, scientists prevented participants from accessing syphilis treatment programs available to other residents in the area. The study continued, under numerous US Public Health Service supervisors, until 1972, when a leak to the press resulted in its termination on November 16 of that year. By the end of the study in 1972, only 74 of the test subjects were alive. 28 of the original 399 men had died of syphilis, 100 were dead of related complications, 40 of their wives had been infected, and 19 of their children were born with congenital syphilis.</p>
Orphan Monster Experiment	<p>In 1939, at the Iowa Soldiers' Orphans' Home in Davenport, Iowa, twenty-two children were the subjects of the so-called "monster" experiment. This experiment attempted to use psychological abuse to induce stuttering in children who spoke normally. The experiment was designed by Dr. Wendell Johnson, one of the nation's most prominent speech pathologists, for the purpose of testing one of his theories on the cause of stuttering.</p>
Infant Herpes Experiment	<p>In 1941 Dr. William C. Black inoculated a twelve-month-old baby with herpes who was "offered as a volunteer". He submitted his research to The Journal of Experimental Medicine which rejected the findings due to the ethically questionable research methods used in the study. The editor of the Journal of Experimental Medicine, Francis Peyton Rous, called the experiment "an abuse of power, an infringement of the rights of an individual, and not excusable because the illness which followed had implications for science." The study was later published in the Journal of Pediatrics.</p>
United States Eugenics Programs	<p>Eugenics was practiced in the United States many years before eugenics programs in Nazi Germany, which were largely inspired by the previous American work. Stefan Kühl has documented the consensus between Nazi race policies and those of eugenicists in other countries, including the United States, and points out that eugenicists understood Nazi policies and measures as the realization of their goals and demands. Beginning with Connecticut in 1896, many states enacted marriage laws with eugenic criteria, prohibiting anyone who was "epileptic, imbecile or feeble-minded" from marrying.</p> <p>The first state to introduce a compulsory sterilization bill was Michigan, in 1897 but the proposed law failed to garner enough votes by legislators to be adopted. Eight years later Pennsylvania's state legislators passed a sterilization bill that was vetoed by the governor. Indiana became the first state to enact sterilization legislation in 1907, followed closely by Washington and California in 1909. Sterilization rates across the country were relatively low (California being the sole exception) until the 1927 Supreme Court case <i>Buck v. Bell</i> which legitimized the forced sterilization of patients at a Virginia home for the mentally retarded. The number of sterilizations performed per year increased until another Supreme Court case, <i>Skinner v. Oklahoma</i>, 1942, complicated the legal situation by ruling against sterilization of criminals if the equal protection clause of the constitution was violated. That is, if sterilization was to be performed, then it could not exempt white-collar criminals. The state of California was at the vanguard of the American eugenics movement, performing about 20,000 sterilizations or one third of the 60,000 nationwide from 1909 up until the 1960s.</p> <p>While California had the highest number of sterilizations, North Carolina's eugenics program which operated from 1933 to 1977, was the most aggressive of the 32 states that had eugenics programs. An IQ of 70 or lower meant sterilization was appropriate in North Carolina. The North Carolina Eugenics Board almost always approved proposals brought before them by local welfare boards. Of all states, only North Carolina gave social workers the power to designate people for sterilization. "Here, at last, was a method of preventing unwanted pregnancies by an acceptable, practical, and inexpensive method," wrote Wallace Kuralt in the March 1967 journal of the N.C. Board of Public Welfare. "The poor readily adopted the new techniques for birth control."</p> <p>Some states sterilized "imbeciles" for much of the 20th century. Although compulsory sterilization is now considered an abuse of human rights, <i>Buck v. Bell</i> was never overturned, and Virginia did not repeal its sterilization law until 1974. The most significant era of eugenic sterilization was between 1907 and 1963, when over 64,000 individuals were forcibly sterilized under eugenic legislation in the United States. Beginning around 1930, there was a steady increase in the percentage of women sterilized, and in a few states only young women were sterilized. From 1930 to the 1960s, sterilizations were performed on many more institutionalized women than men. By 1961, 61 percent of the 62,162 total eugenic sterilizations in the United States were performed on women. A favorable report on the results of sterilization in California, the state with the most sterilizations by far, was published in book form by the biologist Paul Popenoe and was widely cited by the Nazi government as evidence that wide-reaching sterilization programs were feasible and humane.</p> <p>Men and women were compulsorily sterilized for different reasons. Men were sterilized to treat their aggression and to eliminate their criminal behavior, while women were sterilized to control the results</p>

	<p>of their sexuality. Since women bore children, eugenicists held women more accountable than men for the reproduction of the less "desirable" members of society. Eugenicists therefore predominantly targeted women in their efforts to regulate the birth rate, to "protect" white racial health, and weed out the "defectives" of society.</p> <p>In the 1970s, several activists and women's rights groups discovered several physicians to be performing coerced sterilizations of specific ethnic groups of society. All were abuses of poor, nonwhite, or mentally retarded women, while no abuses against white or middle-class women were recorded. Several court cases such as <i>Madrigal v. Quilligan</i>, a class action suit regarding forced or coerced postpartum sterilization of Latina women following cesarean sections, and <i>Relf v. Weinberger</i>, the sterilization of two young black girls by tricking their illiterate mother into signing a waiver, helped bring to light some of the widespread abuses of sterilization supported by federal funds.</p> <p>In 1972, United States Senate committee testimony brought to light that at least 2,000 involuntary sterilizations had been performed on poor black women without their consent or knowledge. An investigation revealed that the surgeries were all performed in the South, and were all performed on black welfare mothers with multiple children. Testimony revealed that many of these women were threatened with an end to their welfare benefits until they consented to sterilization. These surgeries were instances of sterilization abuse, a term applied to any sterilization performed without the consent or knowledge of the recipient, or in which the recipient is pressured into accepting the surgery. Because the funds used to carry out the surgeries came from the U.S. Office of Economic Opportunity, the sterilization abuse raised older suspicions, especially amongst the black community, that "federal programs were underwriting eugenicists who wanted to impose their views about population quality on minorities and poor women."</p> <p>Native American women were also victims of sterilization abuse up into the 1970s. The organization WARN (Women of All Red Nations) publicized that Native American women were threatened that, if they had more children, they would be denied welfare benefits. The Indian Health Service also repeatedly refused to deliver Native American babies until their mothers, in labor, consented to sterilization. Many Native American women unknowingly gave consent, since directions were not given in their native language. According to the General Accounting Office, an estimate of 3,406 Indian women were sterilized. The General Accounting Office stated that the Indian Health Service had not followed the necessary regulations, and that the "informed consent forms did not adhere to the standards set by the United States Department of Health, Education, and Welfare (HEW)."</p> <p>In 2013, it was reported that 148 female prisoners in two California prisons were sterilized between 2006 and 2010 in a supposedly voluntary program, but it was determined that the prisoners did not give consent to the procedures. In September 2014, California enacted Bill SB1135 that bans sterilization in correctional facilities, unless the procedure is required to save an inmate's life.</p> <p>Edwin Black wrote that one of the methods that was suggested to get rid of "defective germ-plasm in the human population" was euthanasia. A 1911 Carnegie Institute report explored eighteen methods for removing defective genetic attributes, and method number eight was euthanasia. The most commonly suggested method of euthanasia was to set up local gas chambers. However, many in the eugenics movement did not believe that Americans were ready to implement a large-scale euthanasia program, so many doctors had to find clever ways of subtly implementing eugenic euthanasia in various medical institutions. For example, a mental institution in Lincoln, Illinois fed its incoming patients milk infected with tuberculosis (reasoning that genetically fit individuals would be resistant), resulting in 30–40% annual death rates. Other doctors practiced euthanasia through various forms of lethal neglect.</p> <p>In the 1930s, there was a wave of portrayals of eugenic "mercy killings" in American film, newspapers, and magazines. In 1931, the Illinois Homeopathic Medicine Association began lobbying for the right to euthanize "imbeciles" and other defectives. The Euthanasia Society of America was founded in 1938. Overall, however, euthanasia was marginalized in the U.S., motivating people to turn to forced segregation and sterilization programs as a means for keeping the "unfit" from reproducing.</p> <p>Eugenics like behavior continues even today, in 2017 BBC News reported that in Sparta, Tennessee, Judge Sam Benningfield had reduced the criminal sentences of some inmates by 30 days in exchange for inmates getting a vasectomy or a long-acting birth control implant.</p>
Stateville Penitentiary Malaria Study	<p>The Stateville Penitentiary Malaria Study was a controlled study of the effects of malaria on the prisoners of Stateville Penitentiary near Joliet, Illinois, beginning in the 1940s. The study was conducted by the Department of Medicine at the University of Chicago in conjunction with the United States Army and the State Department. At the Nuremberg trials, Nazi doctors cited the precedent of the malaria experiments as part of their defense. The study continued at Stateville Penitentiary for 29 years. In related studies from 1944 to 1946, Dr. Alf Alving, a professor at the University of Chicago Medical</p>

	School, purposely infected psychiatric patients at the Illinois State Hospital with malaria, so that he could test experimental treatments on them
Nazi Eugenics Program	<p>Nazi eugenics were Nazi Germany's racially based social policies that placed the biological improvement of the Aryan race or Germanic "Übermenschen" master race through eugenics at the center of Nazi ideology. Eugenics research in Germany before and during the Nazi period was similar to that in the United States (particularly California), by which it had been partly inspired. However, its prominence rose sharply under Adolf Hitler's leadership when wealthy Nazi supporters started heavily investing in it. The programs were subsequently shaped to complement Nazi racial policies.</p> <p>Those humans targeted for destruction under Nazi eugenics policies were largely living in private and state-operated institutions, identified as "life unworthy of life" (German: Lebensunwertes Leben), including prisoners, degenerate, dissident, people with congenital cognitive and physical disabilities (including feeble-minded, epileptic, schizophrenic, manic-depressive, cerebral palsy, muscular dystrophy, deaf, blind) (German: erbkranken), homosexual, idle, insane, and the weak, for elimination from the chain of heredity. More than 400,000 people were sterilized against their will, while more than 70,000 were killed under Action T4, a euthanasia program.</p>
Guatemalan Syphilis Experiments	In a 1946 to 1948 study in Guatemala, U.S. researchers used prostitutes to infect prison inmates, insane asylum patients, and Guatemalan soldiers with syphilis and other sexually transmitted diseases, in order to test the effectiveness of penicillin in treating the STDs. They later tried infecting people with "direct inoculations made from syphilis bacteria poured into the men's penises and on forearms and faces that were slightly abraded . . . or in a few cases through spinal punctures". Approximately 700 people were infected as part of the study (including orphan children). The study was sponsored by the Public Health Service, the National Institutes of Health and the Pan American Health Sanitary Bureau (now the World Health Organization's Pan American Health Organization) and the Guatemalan government. The team was led by John Charles Cutler, who later participated in the Tuskegee syphilis experiments. Cutler chose to do the study in Guatemala because he would not have been permitted to do it in the United States. In 2010 when the research was revealed, the US officially apologized to Guatemala for the studies. A lawsuit has been launched against Johns Hopkins University, Bristol-Myers Squibb and the Rockefeller Foundation for alleged involvement in the study.
U.S. Navy Biological Warfare Experiments	In 1950, in order to conduct a simulation of a biological warfare attack, the U.S. Navy sprayed large quantities of the bacteria <i>Serratia marcescens</i> – considered harmless at this time – over the city of San Francisco during a project called Operation Sea-Spray. Numerous citizens contracted pneumonia-like illnesses, and at least one person died as a result. The family of the man who died sued the government for gross negligence, but a federal judge ruled in favor of the government in 1981. <i>Serratia</i> tests were continued until at least 1969.
Stokes Hepatitis Experiment	Also in 1950, Dr. Joseph Stokes of the University of Pennsylvania deliberately infected 200 female prisoners with viral hepatitis.
Mentally Disabled Children Hepatitis Experiments	From the 1950s to 1972, mentally disabled children at the Willowbrook State School in Staten Island, New York were intentionally infected with viral hepatitis, for research whose purpose was to help discover a vaccine. From 1963 to 1966, Saul Krugman of New York University promised the parents of mentally disabled children that their children would be enrolled into Willowbrook in exchange for signing a consent form for procedures that he claimed were "vaccinations." In reality, the procedures involved deliberately infecting children with viral hepatitis by feeding them an extract made from the feces of patients infected with the disease.
Southam Cancer Experiments	In 1952, Chester M. Southam, a Sloan-Kettering Institute researcher, injected live cancer cells, known as HeLa cells, into prisoners at the Ohio State Penitentiary and cancer patients. Also at Sloan-Kettering, 300 healthy women were injected with live cancer cells without being told. The doctors stated that they knew at the time that it might cause cancer. In 1963, 22 elderly patients at the Jewish Chronic Disease Hospital in Brooklyn, New York were injected with live cancer cells again by Chester M. Southam in order to "discover the secret of how healthy bodies fight the invasion of malignant cells". The administration of the hospital attempted to cover the study up, but the New York medical licensing board ultimately placed Southam on probation for one year. Two years later, the American Cancer Society elected him as their Vice President
Project Shipboard Hazard and Defense (SHAD)	From 1963 to 1969 as part of Project Shipboard Hazard and Defense (SHAD), the U.S. Army performed tests which involved spraying several U.S. ships with various biological and chemical warfare agents, while thousands of U.S. military personnel were aboard the ships. The personnel were not notified of the tests, and were not given any protective clothing. Chemicals tested on the U.S. military personnel included the nerve gases VX and Sarin, toxic chemicals such as zinc cadmium sulfide and sulfur dioxide, and a variety of biological agents.
Subway Biological Experiments	In 1966, the U.S. Army released <i>Bacillus globigii</i> into the tunnels of the New York City Subway system, as part of a field study called A Study of the Vulnerability of Subway Passengers in New York City to Covert Attack with Biological Agents. The Chicago subway system was also subject to a similar experiment by the Army.
U.S. Human Radiation Experiments	Researchers in the United States have performed thousands of human radiation experiments to determine the effects of atomic radiation and radioactive contamination on the human body, generally

	<p>on people who were poor, sick, or powerless. Most of these tests were performed, funded, or supervised by the United States military, Atomic Energy Commission, or various other US federal government agencies. The experiments included a wide array of studies, involving things like feeding radioactive food to mentally disabled children or conscientious objectors, inserting radium rods into the noses of schoolchildren, deliberately releasing radioactive chemicals over U.S. and Canadian cities, measuring the health effects of radioactive fallout from nuclear bomb tests, injecting pregnant women and babies with radioactive chemicals, and irradiating the testicles of prison inmates, amongst other things. Much information about these programs was classified and kept secret. In 1986 the United States House Committee on Energy and Commerce released a report titled American Nuclear Guinea Pigs : Three Decades of Radiation Experiments on U.S. Citizens.</p>
Russian Human Radiation Experiments	<p>The Soviet nuclear program involved human experiments on a large scale, including most notably the Totskoye nuclear exercise of 1954 and the experiments conducted at the Semipalatinsk Test Site (1949-1989). As of 1950, there were around 700,000 participants at different levels of the program, half of whom were Gulag prisoners used for radioactivity experiments, as well as the excavation of radioactive ores. Information about the scale, conditions and lethality of those involved in the program is still kept secret by the Russian government and the Rosatom agency.</p>
Venezuelan Radioactive Iodine Experiments	<p>The Venezuelan geneticist Marcel Roche was implicated in Patrick Tierney's 2000 publication, Darkness in El Dorado, for allegedly administering radioactive iodine to indigenous peoples in the Orinoco basin of Venezuela, such as the Yanomami and Ye'Kwana peoples, in cooperation with the US Atomic Energy Commission (AEC), possibly with no apparent benefit for the test group and without obtaining proper informed consent. This corresponded to similar administrations of iodine-124 by the French anthropologist Jacques Lizot in cooperation with the French Atomic Energy Commission (CEA).</p>
Harvard Estrogen Experiments	<p>At Harvard University, in the late 1940s, researchers began performing experiments in which they tested diethylstilbestrol, a synthetic estrogen, on pregnant women at the Lying-In Hospital of the University of Chicago. The women experienced an abnormally high number of miscarriages and babies with low birth weight (LBW). None of the women were told that they were being experimented on.</p>
Unit 731 Experiments	<p>Unit 731 was a covert biological and chemical warfare research and development unit of the Imperial Japanese Army that undertook lethal human experimentation during the Second Sino-Japanese War (1937–1945) of World War II. It was responsible for some of the most notorious war crimes carried out by Japan. Some historians estimate that up to 250,000 men, women, and children—from which at least 600 every year were provided by the Kempeitai—were subjected to experimentation conducted by Unit 731 at the camp based in Pingfang alone, which does not include victims from other medical experimentation sites, such as Unit 100. Unit 731 veterans of Japan attest that most of the victims they experimented on were Chinese while a small percentage were Russian, Mongolian, Korean, and Allied POWs. Instead of being tried for war crimes, the researchers involved in Unit 731 were secretly given immunity by the U.S. in exchange for the data they gathered through human experimentation. Others that Soviet forces managed to arrest first were tried at the Khabarovsk War Crime Trials in 1949. Americans did not try the researchers so that the information and experience gained in bio-weapons could be co-opted into the U.S. biological warfare program, as had happened with Nazi researchers in Operation Paperclip.</p> <p>Thousands of men, women and children interned at prisoner of war camps were subjected to vivisection, often without anesthesia and usually ending with the death of the victim. Vivisections were performed on prisoners after infecting them with various diseases. Researchers performed invasive surgery on prisoners, removing organs to study the effects of disease on the human body. These were conducted while the patients were alive because it was feared that the decomposition process would affect the results. The infected and vivisected prisoners included men, women, children, and infants. Prisoners had limbs amputated in order to study blood loss. Those limbs that were removed were sometimes re-attached to the opposite sides of the body. Some prisoners' limbs were frozen and amputated, while others had limbs frozen, then thawed to study the effects of the resultant untreated gangrene and rotting. Some prisoners had their stomachs surgically removed and the oesophagus reattached to the intestines. Parts of the brain, lungs, liver, etc., were removed from some prisoners. Japanese army surgeon Ken Yuasa suggests that the practice of vivisection on human subjects (mostly Chinese communists) was widespread even outside Unit 731, estimating that at least 1,000 Japanese personnel were involved in the practice in mainland China.</p> <p>Physiologist Yoshimura Hisato conducted experiments by taking captives outside, dipping various appendages into water, and allowing the limb to freeze. Once frozen, which testimony from a Japanese officer said "was determined after the 'frozen arms, when struck with a short stick, emitted a sound resembling that which a board gives when it is struck'", ice was chipped away and the area doused in water. The effects of different water temperatures were tested by bludgeoning the victim to determine if any areas were still frozen. Variations of these tests in more gruesome forms were performed.</p> <p>Prisoners were injected with diseases, disguised as vaccinations, to study their effects. To study the</p>

	<p>effects of untreated venereal diseases, male and female prisoners were deliberately infected with syphilis and gonorrhoea, then studied. Prisoners were also repeatedly subject to rape by guards. Doctors orchestrated forced sex acts between infected and non-infected prisoners to transmit the disease, as the testimony of a prison guard on the subject of devising a method for transmission of syphilis between patients shows: "Infection of venereal disease by injection was abandoned, and the researchers started forcing the prisoners into sexual acts with each other. Four or five unit members, dressed in white laboratory clothing completely cover the body with only eyes and mouth visible, handled the tests. A male and female, one infected with syphilis, would be brought together in a cell and forced into sex with each other. It was made clear that anyone resisting would be shot." After victims were infected, they were vivisected at different stages of infection, so that internal and external organs could be observed as the disease progressed. Testimony from multiple guards blames the female victims as being hosts of the diseases, even as they were forcibly infected. Genitals of female prisoners that were infected with syphilis were called "jam filled buns" by guards. Female prisoners were forced to become pregnant for use in experiments. The hypothetical possibility of vertical transmission (from mother to fetus or child) of diseases, particularly syphilis, was the stated reason for the torture. Fetal survival and damage to mother's reproductive organs were objects of interest. Though "a large number of babies were born in captivity", there has been no account of any survivors of Unit 731, children included. It is suspected that the children of female prisoners were killed or the pregnancies terminated.</p> <p>Human targets were used to test grenades positioned at various distances and in different positions. Flamethrowers were tested on humans. Humans were tied to stakes and used as targets to test germ-releasing bombs, chemical weapons, and explosive bombs. In other tests, subjects were deprived of food and water to determine the length of time until death; placed into high-pressure chambers until death; experimented upon to determine the relationship between temperature, burns, and human survival; placed into centrifuges and spun until death; injected with animal blood; exposed to lethal doses of x-rays; subjected to various chemical weapons inside gas chambers; injected with sea water; and burned or buried alive.</p>
Nazi Human Experiments	<p>Nazi human experimentation was a series of medical experiments on large numbers of prisoners, including children, by Nazi Germany in its concentration camps in the early to mid 1940s, during World War II and the Holocaust. Chief target populations included Romani, Sinti, ethnic Poles, Soviet POWs, disabled Germans, and most prominently of all, Jews from across Europe. Nazi Physicians and their assistants forced prisoners into participating; they did not willingly volunteer and no consent was given for the procedures. Typically, the experiments resulted in death, trauma, disfigurement or permanent disability, and as such are considered examples of medical torture. At Auschwitz and other camps, under the direction of Eduard Wirths, selected inmates were subjected to various hazardous experiments that were designed to help German military personnel in combat situations, develop new weapons, aid in the recovery of military personnel who had been injured, and to advance the Nazi racial ideology. Aribert Heim conducted similar medical experiments at Mauthausen. Carl Værnet is known to have conducted experiments on homosexual prisoners in attempts to "cure" homosexuality. The table of contents of a document from the Nuremberg military tribunals prosecution includes titles of the sections that document medical experiments revolving around: food, seawater, epidemic jaundice, sulfanilamide, blood coagulation and phlegmone.</p> <p>Experiments on twin children in concentration camps were created to show the similarities and differences in the genetics of twins, as well as to see if the human body can be unnaturally manipulated. The central leader of the experiments was Josef Mengele, who from 1943 to 1944 performed experiments on nearly 1,500 sets of imprisoned twins at Auschwitz. About 200 people survived these studies. The twins were arranged by age and sex and kept in barracks between experiments, which ranged from injection of different dyes into the eyes of twins to see whether it would change their color to sewing twins together in attempts to create conjoined twins.</p> <p>From about September 1942 to about December 1943 experiments were conducted at the Ravensbrück concentration camp, for the benefit of the German Armed Forces, to study bone, muscle, and nerve regeneration, and bone transplantation from one person to another. Sections of bones, muscles, and nerves were removed from the subjects without use of anesthesia. As a result of these operations, many victims suffered intense agony, mutilation, and permanent disability.</p> <p>In mid-1942 in Baranowicze, occupied Poland, experiments were conducted in a small building behind the private home occupied by a known Nazi SD Security Service officer, in which "a young boy of eleven or twelve [was] strapped to a chair so he could not move. Above him was a mechanized hammer that every few seconds came down upon his head." The boy was driven insane from the torture.</p> <p>In 1941, the Luftwaffe conducted experiments with the intent of discovering means to prevent and treat hypothermia. There were 360 to 400 experiments and 280 to 300 victims indicating some victims suffered more than one experiment. Another study placed prisoners naked in the open air for several</p>

hours with temperatures as low as -6°C (21°F). Besides studying the physical effects of cold exposure, the experimenters also assessed different methods of rewarming survivors. "One assistant later testified that some victims were thrown into boiling water for rewarming. In a letter from September 10th 1942, Dr. Sigmund Rascher describes an experiment on intense cooling performed in Dachau where people were dressed in fighter Pilot uniforms and submerged in freezing water. Doctor Rascher had some of the victims completely underwater and other only submerged up to the head. Approximately 100 people are reported to have died as a result of these experiments.

From about February 1942 to about April 1945, experiments were conducted at the Dachau concentration camp in order to investigate immunization for treatment of malaria. Healthy inmates were infected by mosquitoes or by injections of extracts of the mucous glands of female mosquitoes. After contracting the disease, the subjects were treated with various drugs to test their relative efficiency. Over 1,200 people were used in these experiments and more than half died as a result.

At the German concentration camps of Sachsenhausen, Dachau, Natzweiler, Buchenwald, and Neuengamme, scientists tested immunization compounds and serums for the prevention and treatment of contagious diseases, including malaria, typhus, tuberculosis, typhoid fever, yellow fever, and infectious hepatitis.

At various times between September 1939 and April 1945, many experiments were conducted at Sachsenhausen, Natzweiler, and other camps to investigate the most effective treatment of wounds caused by mustard gas. Test subjects were deliberately exposed to mustard gas and other vesicants (e.g. Lewisite) which inflicted severe chemical burns. The victims' wounds were then tested to find the most effective treatment for the mustard gas burns.

From about July 1942 to about September 1943, experiments to investigate the effectiveness of sulfonamide, a synthetic antimicrobial agent, were conducted at Ravensbrück. Wounds inflicted on the subjects were infected with bacteria such as *Streptococcus*, *Clostridium perfringens* (a major causative agent in gas gangrene) and *Clostridium tetani*, the causative agent in tetanus. Circulation of blood was interrupted by tying off blood vessels at both ends of the wound to create a condition similar to that of a battlefield wound. Infection was aggravated by forcing wood shavings and ground glass into the wounds. The infection was treated with sulfonamide and other drugs to determine their effectiveness.

From about July 1944 to about September 1944, experiments were conducted at the Dachau concentration camp to study various methods of making sea water drinkable. At one point, a group of roughly 90 Roma were deprived of food and given nothing but sea water to drink by Dr. Hans Eppinger, leaving them gravely injured. They were so dehydrated that others observed them licking freshly mopped floors in an attempt to get drinkable water.

The Law for the Prevention of Genetically Defective Progeny was passed on 14 July 1933, which legalized the involuntary sterilization of persons with diseases claimed to be hereditary: weak-mindedness, schizophrenia, alcohol abuse, insanity, blindness, deafness, and physical deformities. The law was used to encourage growth of the Aryan race through the sterilization of persons who fell under the quota of being genetically defective. 1% of citizens between the age of 17 to 24 had been sterilized within 2 years of the law passing. Within 4 years, 300,000 patients had been sterilized. From about March 1941 to about January 1945, sterilization experiments were conducted at Auschwitz, Ravensbrück, and other places by Dr. Carl Clauberg. The purpose of these experiments was to develop a method of sterilization which would be suitable for sterilizing millions of people with a minimum of time and effort. These experiments were conducted by means of X-ray, surgery and various drugs. Thousands of victims were sterilized. Aside from its experimentation, the Nazi government sterilized around 400,000 people as part of its compulsory sterilization program. Intravenous injections of solutions speculated to contain iodine and silver nitrate were successful, but had unwanted side effects such as vaginal bleeding, severe abdominal pain, and cervical cancer. Therefore, radiation treatment became the favored choice of sterilization. Specific amounts of exposure to radiation destroyed a person's ability to produce ova or sperm, sometimes administered through deception. Many suffered severe radiation burns. M.D. William E. Seidelman is a professor from the University of Toronto who in collaboration with Dr. Howard Israel of Columbia University published a report on an investigation on the Medical experimentations performed in Austria under the Nazi Regime. In that report he mentions a Doctor Hermann Stieve, whom used the war to experiment on live humans. Dr. Stieve specifically focused on the reproductive system of women. He would tell women their execution date in advanced, and he would evaluate how their psychological distress would affect their menstruation cycles. After they were murdered, he would dissect and examine their reproductive organs. Some of the women were even raped after they were told the date when they would be killed, so that Dr. Stieve could study the path of sperm through their reproductive system.

	<p>Somewhere between December 1943 and October 1944, experiments were conducted at Buchenwald to investigate the effect of various poisons. The poisons were secretly administered to experimental subjects in their food. The victims died as a result of the poison or were killed immediately in order to permit autopsies. In September 1944, experimental subjects were shot with poisonous bullets, suffered torture and often died.</p> <p>From around November 1943 to around January 1944, experiments were conducted at Buchenwald to test the effect of various pharmaceutical preparations on phosphorus burns. These burns were inflicted on prisoners using phosphorus material extracted from incendiary bombs.</p> <p>In early 1942, prisoners at Dachau concentration camp were used by Sigmund Rascher in experiments to aid German pilots who had to eject at high altitudes. A low-pressure chamber containing these prisoners was used to simulate conditions at altitudes of up to 20,000 m (66,000 ft). It was rumored that Rascher performed vivisections on the brains of victims who survived the initial experiment. Of the 200 subjects, 80 died outright, and the others were executed. In a letter from April 5th 1942 between Dr. Sigmund Rascher and Heinrich Himmler, Rascher explains the results of a low-pressure experiment that was performed on people at Dachau Concentration camp in which the victims were suffocated for to death while Rascher and another unnamed doctor took note of his reactions. The person was described as 37 years old and in good health before being murdered. Rascher described the victim's actions as he began to loose oxygen and times the changes in behavior. The 37 year old began to wiggle his head at 4 minutes, a minute later Rascher observed that he was suffering from cramps before falling unconscious. He describes how the victim then laid unconscious breathing only 3 times per minute until he stopped breathing 30 minutes after being deprived of oxygen. The victim then turned blue and began foaming at the mouth. An autopsy followed an hour later. In a letter from Heinrich Himmler to Dr. Sigmund Rascher on April 13th 1942, Himmler orders Rascher to continue the high altitude experiments and to continue experimenting on prisoners condemned to death and to "determine whether these men could be recalled to life". If a victim could be successfully resuscitated, Himmler ordered that he be pardoned to "concentration camp for life".</p> <p>Sigmund Rascher experimented with the effects of Polygal, a substance made from beet and apple pectin, which aided blood clotting. He predicted that the preventive use of Polygal tablets would reduce bleeding from gunshot wounds sustained during combat or during surgery. Subjects were given a Polygal tablet, and shot through the neck or chest, or their limbs amputated without anaesthesia. Rascher published an article on his experience of using Polygal, without detailing the nature of the human trials and also set up a company to manufacture the substance, staffed by prisoners.</p>
Bender Electroshock Experiments	<p>From early 1940 until 1953, Lauretta Bender, a highly respected pediatric neuropsychiatrist who practiced at Bellevue Hospital in New York City, performed electroshock experiments on at least 100 children. The children's ages ranged from 3–12 years. Some reports indicate that she may have performed such experiments on more than 200. From 1942 to 1956, electroconvulsive treatment was used on more than 500 children at Bellevue Hospital, including Bender's experiments; from 1956 to 1969, ECT was used at Creedmoor State Hospital Children's Service. Publicly, Bender claimed that the results of the "therapy" were positive, but in private memos, she expressed frustration over mental health issues caused by the treatments. Bender would sometimes shock children with schizophrenia (some less than 3 years old) twice per day, for 20 consecutive days. Several of the children became violent and suicidal as a result of the treatments.</p>
Children Acne Experiment	<p>In 1962, researchers at the Laurel Children's Center in Maryland tested experimental acne medications on children. They continued their tests even after half of the children developed severe liver damage from the medications.</p>
Children Cantharide Experiments	<p>A 1953 article in the medical/scientific journal Clinical Science described a medical experiment in which researchers intentionally blistered the skin on the abdomens of 41 children, who ranged in age from 8 to 14, using cantharide. The study was performed to determine how severely the substance injures/irritates the skin of children. After the studies, the children's blistered skin was removed with scissors and swabbed with peroxide.</p>
U.S. Army Chemical, Biological, and Radiological Experiments	<p>In June 1953 the United States Army formally adopted guidelines regarding the use of human subjects in chemical, biological, or radiological testing and research, where authorization from the Secretary of the Army was now required for all research projects involving human subjects. Under the guidelines, seven research projects involving chemical weapons and human subjects were submitted by the Chemical Corps for Secretary of the Army approval in August 1953. One project involved vesicants, one involved phosgene, and five were experiments which involved nerve agents; all seven were approved. The guidelines, however, left a loophole; they did not define what types of experiments and tests required such approval from the Secretary. Operation Top Hat was among the numerous projects not submitted for approval. It was termed a "local field exercise" by the Army and took place from September 15–19, 1953 at the Army Chemical School at Fort McClellan, Alabama. The experiments used Chemical Corps personnel to test decontamination methods for biological and chemical weapons, including sulfur mustard and nerve agents. The personnel were deliberately exposed to these</p>

	contaminants, were not volunteers, and were not informed of the tests. In a 1975 Pentagon Inspector General's report, the military maintained that Operation Top Hat was not subject to the guidelines requiring approval because it was a line of duty exercise in the Chemical Corps.
Infant Blood Experiments	In a series of studies which were published in the medical journal Pediatrics, researchers from the University of California Department of Pediatrics performed experiments on 113 newborns ranging in age from 1-hour to 3 days, in which they studied changes in blood pressure and blood flow. In one of the studies, researchers inserted a catheter through the babies' umbilical arteries and into their aortas, and then submerged their feet in ice water. In another of the studies, they strapped 50 newborn babies to a circumcision board, and turned them upside down so that all of their blood rushed into their heads.
Holmesburg Prison Experiments	From approximately 1951 to 1974, the Holmesburg Prison in Pennsylvania was the site of extensive dermatological research operations, using prisoners as subjects. Led by Dr. Albert M. Kligman of the University of Pennsylvania, the studies were performed on behalf of Dow Chemical Company, the U.S. Army, and Johnson & Johnson. In one of the studies, for which Dow Chemical paid Kligman \$10,000, Kligman injected dioxin — a highly toxic, carcinogenic compound found in Agent Orange, which Dow was manufacturing for use in Vietnam at the time — into 70 prisoners (most of them black). The prisoners developed severe lesions which went untreated for seven months. Dow Chemical wanted to study the health effects of dioxin and other herbicides, and how they affect human skin, because workers at their chemical plants were developing chloracne. In the study, Kligman applied roughly the same amount of dioxin as that to which Dow employees were being exposed. In 1980 and 1981, some of the people who were used in this study sued Professor Kligman for a variety of health problems, including lupus and psychological damage. Kligman later continued his dioxin studies, increasing the dosage of dioxin he applied to the skin of 10 prisoners to 7,500 micrograms of dioxin, which is 468 times the dosage that the Dow Chemical official Gerald K. Rowe had authorized him to administer. As a result, the prisoners developed inflammatory pustules and papules. The Holmesburg program paid hundreds of inmates a nominal stipend to test a wide range of cosmetic products and chemical compounds, whose health effects were unknown at the time. Upon his arrival at Holmesburg, Kligman is claimed to have said, "All I saw before me were acres of skin ... It was like a farmer seeing a fertile field for the first time." A 1964 issue of Medical News reported that 9 out of 10 prisoners at Holmesburg Prison were medical test subjects. In 1967, the U.S. Army paid Kligman to apply skin-blistering chemicals to the faces and backs of inmates at Holmesburg, in Kligman's words, "to learn how the skin protects itself against chronic assault from toxic chemicals, the so-called hardening process."
Project Bluebird	In 1950, the CIA initiated Project Bluebird, later renamed Project Artichoke, whose stated purpose was to develop "the means to control individuals through special interrogation techniques", "way[s] to prevent the extraction of information from CIA agents", and "offensive uses of unconventional techniques, such as hypnosis and drugs". The purpose of the project was outlined in a memo dated January 1952 that stated, "Can we get control of an individual to the point where he will do our bidding against his will and even against fundamental laws of nature, such as self-preservation?" The project studied the use of hypnosis, forced morphine addiction and subsequent forced withdrawal, and the use of other chemicals, among other methods, to produce amnesia and other vulnerable states in subjects. In order to "perfect techniques ... for the abstraction of information from individuals, whether willing or not", Project Bluebird researchers experimented with a wide variety of psychoactive substances, including LSD, heroin, marijuana, cocaine, PCP, mescaline, and ether. Project Bluebird researchers dosed over 7,000 U.S. military personnel with LSD, without their knowledge or consent, at the Edgewood Arsenal in Maryland. Years after these experiments, more than 1,000 of these soldiers suffered from several illnesses, including depression and epilepsy. Many of them tried to commit suicide. A memorandum by Richard Helms to CIA director Allen Welsh Dulles indicated Artichoke became Project MKULTRA on April 13, 1953.
Project MKUltra	<p>Project MKUltra — sometimes referred to as the CIA's mind control program — is the code name given to a program of experiments on human subjects, at times illegal, designed and undertaken by the United States Central Intelligence Agency. Experiments on humans were intended to identify and develop drugs and procedures to be used in interrogations and torture, in order to weaken the individual to force confessions through mind control. Organized through the Scientific Intelligence Division of the CIA, the project coordinated with the Special Operations Division of the U.S. Army's Chemical Corps. The operation began in the early 1950s, was officially sanctioned in 1953, was reduced in scope in 1964, further curtailed in 1967, and officially halted in 1973. The program engaged in many illegal activities, including the use of unwitting U.S. and Canadian citizens as its test subjects, which led to controversy regarding its legitimacy. MKUltra used numerous methodologies to manipulate people's mental states and alter brain functions, including the surreptitious administration of drugs (especially LSD) and other chemicals, hypnosis, sensory deprivation, isolation, verbal and sexual abuse, as well as other forms of psychological torture.</p> <p>Project MKUltra was first brought to public attention in 1975 by the Church Committee of the U.S. Congress, and a Gerald Ford commission to investigate CIA activities within the United States. Investigative efforts were hampered by the fact that CIA Director Richard Helms ordered all MKUltra</p>

	files destroyed in 1973; the Church Committee and Rockefeller Commission investigations relied on the sworn testimony of direct participants and on the relatively small number of documents that survived Helms' destruction order. Several known deaths have been associated with Project MKUltra, but given the CIA's purposeful destruction of most records, its failure to follow informed consent protocols with thousands of participants, the uncontrolled nature of the experiments, and the lack of follow-up data, the full impact of MKUltra experiments, including deaths, may never be known.
CIA Waterboarding Experiments	Medical professionals gathered and collected data on the CIA's use of torture techniques on detainees during the 21st century war on terror, in order to refine those techniques, and "to provide legal cover for torture, as well as to help justify and shape future procedures and policies", according to a 2010 report by Physicians for Human Rights. The report stated that: "Research and medical experimentation on detainees was used to measure the effects of large-volume waterboarding and adjust the procedure according to the results." As a result of the waterboarding experiments, doctors recommended adding saline to the water "to prevent putting detainees in a coma or killing them through over-ingestion of large amounts of plain water." Sleep deprivation tests were performed on over a dozen prisoners, in 48-, 96- and 180-hour increments. Doctors also collected data intended to help them judge the emotional and physical effects of the techniques so as to "calibrate the level of pain experienced by detainees during interrogation" and to determine if using certain types of techniques would increase a subject's "susceptibility to severe pain." In 2010, the CIA denied the allegations, claiming they never performed any experiments, and saying "The report is just wrong"; however, the U.S. government never investigated the claims. The psychologists James Mitchell and Bruce Jessen ran a company that was paid \$81 million by the CIA, that, according to the Senate Intelligence Committee report on CIA torture, developed the "enhanced interrogation techniques" used. In November 2014, the American Psychological Association announced that they would hire a lawyer to investigate claims that they were complicit in the development of enhanced interrogation techniques that constituted torture.
Northfield Labs Blood Experiment	During the decade of 2000–2010, artificial blood was transfused into research subjects across the United States without their consent by Northfield Labs. Later studies showed the artificial blood caused a significant increase in the risk of heart attacks and death.
Forced Sterilisation in Sweden	Forced sterilisation in Sweden (Swedish: Tvångssterilisering i Sverige) occurred between 1934 and 1975. Originally the aim of the sterilisation policy was to protect society and it targeted the so-called feeble-minded or other individuals who were considered unfit. This practice peaked in the mid 1940s. In 1944 85% of the sterilisations were performed on eugenic grounds. From the 1950s and onwards the law came to be used mostly in the interest of the individual, for social or medical reasons, under varying degrees of pressure from doctors and social workers. According to the 2000 governmental report, 21,000 were estimated to have been forcibly sterilised, 6,000 were coerced into a 'voluntary' sterilisation while the nature of a further 4,000 cases could not be determined.
North Korea Human Experiments	Human experimentation was described by several North Korean defectors, including former prisoner Lee Soon-ok, former prison guards Kwon Hyok and Ahn Myung Chul, and others. Lee described an experiment in which 50 healthy women prisoners were selected and given poisoned cabbage leaves. All of the women were required to eat the cabbage, despite cries of distress from those who had already eaten. All 50 died after 20 minutes of vomiting blood and anal bleeding. Refusing to eat the cabbage would allegedly have meant reprisals against them and their families. Kwon Hyok, a former head of security at Camp 22, described laboratories equipped with gas chambers for suffocation gas experiments, in which three or four people, normally a family, are the experimental subjects. After undergoing medical checks, the chambers are sealed and poison is injected through a tube, while scientists observe from above through glass. In a report reminiscent of an earlier account of a family of seven, Kwon claims to have watched one family of two parents, a son and a daughter die from suffocating gas, with the parents trying to save the children using mouth-to-mouth resuscitation for as long as they had the strength. Former prison guard Ahn Myung Chul has reported that prisoners were used for "medical operation practice" by young doctors who practice surgery on prisoners without anesthesia. He also described deliberate efforts to study physical resistance by starving prisoners to death. According to him, "The people who carry out these executions and these experiments all drink before they do it. But they are real experts now; sometimes they hit prisoners with a hammer, on the back of the head. The poor prisoners then lose their memory, and they use them as zombies for target practice. When the Third Bureau is running out of subjects, a black van known as "the crow" turns up and picks out a few more prisoners, sowing panic among the rest. The crow comes about once a month and takes forty or fifty people off to an unknown destination."
Xenotransplantation	Xenotransplantation is the transplantation of living cells, tissues or organs from one species to another. Such cells, tissues or organs are called xenografts or xenotransplants. It is contrasted with allotransplantation (from other individual of same species), Syngeneic transplantation (Grafts transplanted between two genetically identical individuals of the same species) and Autotransplantation (from one part of the body to another in the same person). Xenotransplantation of human tumor cells into immunocompromised mice is a research technique frequently used in pre-clinical oncology research. Human xenotransplantation offers a potential treatment for end-stage organ failure, a significant health

	<p>problem in parts of the industrialized world. It also raises many novel medical, legal and ethical issues. A continuing concern is that many animals, such as pigs, have a shorter lifespan than humans, meaning that their tissues age at a quicker rate. Disease transmission (xenozoonosis) and permanent alteration to the genetic code of animals are also causes for concern. A few successful cases of xenotransplantation are published.</p> <p>The first serious attempts at xenotransplantation (then called heterotransplantation) appeared in the scientific literature in 1905, when slices of rabbit kidney were transplanted into a child with renal insufficiency. In the first two decades of the 20th century, several subsequent efforts attempted to use organs from lambs, pigs and primates. Scientific interest in xenotransplantation declined when the immunological basis of the organ rejection process was described. The next waves of studies on the topic came with the discovery of immunosuppressive drugs. Even more studies followed Dr. Joseph Murray's first successful kidney transplantation in 1954 and scientists, facing the ethical questions of organ donation for the first time, accelerated their effort in looking for alternatives to human organs.</p> <p>In 1963, doctors at Tulane University attempted chimpanzee-to-human kidney transplantations in six people who were near death; after this and several subsequent unsuccessful attempts to use primates as organ donors and the development of a working cadaver organ procuring program, interest in xenotransplantation for kidney failure dissipated.</p> <p>An American infant girl known as "Baby Fae" with hypoplastic left heart syndrome was the first infant recipient of a xenotransplantation, when she received a baboon heart in 1984. The procedure was performed by Leonard L. Bailey at Loma Linda University Medical Center in Loma Linda, California. Fae died 21 days later due to a humoral-based graft rejection thought to be caused mainly by an ABO blood type mismatch, considered unavoidable due to the rarity of type O baboons. The graft was meant to be temporary, but unfortunately a suitable allograft replacement could not be found in time.</p> <p>Xenotransplantation of human tumor cells into immunocompromised mice is a research technique frequently used in oncology research. It is used to predict the sensitivity of the transplanted tumor to various cancer treatments; several companies offer this service, including the Jackson Laboratory and Altogen Labs. Human organs have been transplanted into animals as a powerful research technique for studying human biology without harming human patients. This technique has also been proposed as an alternative source of human organs for future transplantation into human patients. For example, researchers from the Ganogen Research Institute transplanted human fetal kidneys into rats which demonstrated life supporting function and growth.</p>
SOURCE: Wikipedia (with some corrections, additions, and other edits)	

Was any true medical or scientific knowledge gained from these experiments? How can it be acceptable that a government allows, and sometimes even engages in, experimentation on its own citizens? How many other unknown experiments have been conducted on other unknowing test subjects? Why were so many of the scientists or government officials who were responsible for these experiments not held responsible for their actions? How can such a powerful division of a democratic government like the CIA be allowed to operate in secrecy and with so little oversight? Why are these negative activities of CIA, KGB, and other similar foreign government agencies viewed as something that is necessary, when clearly there are more proven methods which achieve far better results?

The Next Generation of Frankenstein Scientists

With modern-day advancements in science and technology, a new generation of Frankenstein scientists have only become more advanced and even more morbid, while exercising less restraint. Actions done by mad scientists like those done by neurophysiologist John Lilly, who injecting dolphins with LSD in an attempt to communicate with them, are often seen as eccentric and not viewed as appalling and repugnant. Hare-brained ideas like BioSteel, a fiber created by transgenic goats that produce a recombinant spider silk-like protein which can be extracted from their milk, (366) are viewed as a possible natural revolution for the textile industry. Morbid Frankenstein experimental procedures like parabiosis are still performed for physiological studies, the current protocol is described as,

"...two mice are surgically joined following a modification of the Bunster and Meyer technique. Animals are connected through the elbow and knee joints followed by attachment of the skin allowing firm support that prevents strain on the sutured skin...Two weeks after the procedure, the pair is separated..." (329)

In 2012, electrical engineers Tahmid Latif and Alper Bozkurt reported they had successfully created a biobot, and were able to control the physical actions of some insects by implanting electrical components. In the paper they stated,

"The recent developments in neuromuscular stimulation research have been used to navigate the aerial insect locomotion to enable insect biobots. In these studies, electrical pulses were applied to the insect to create biomechanical or sensory perturbations in the locomotory control system to steer it in desired directions, similar to steering a horse with bridle and reins. These biobots can potentially assist humans in environmental sensing and search-and-rescue applications to pinpoint hazardous material or to find earthquake victims.

In our earlier studies, we were able to initiate and cease flight, and induce yaw maneuvers in tethered and lift assisted hawkmoths by stimulating the direct flight muscles, antennal lobe and neck muscles. We were also able to decrease the take-off duration by implanting micro-heaters into the insect thorax. We also achieved control of terrestrial locomotion on hawkmoths on a two-dimensional foam-ball treadmill and on flat surface where insect followed the left and right turn signals. Tactile, thermal and electrical stimulation of cockroach antennae by other groups also caused a turning action towards the opposite direction of the stimulated site on "tethered" set-ups. Here, we present wireless electrical stimulation of free-walking cockroaches for precise navigation where the biobots were made to follow lines." (617)

Backyard Brains, a U.S. company, has implemented this technology into a pseudo educational tool, and sells this morbid product known as the RoboRoach Bundle for \$159.99, which it described as,

"Are you a teacher or parent that wants to teach a student about advanced neurotechnologies? You are in luck! We are excited to announce the world's first commercially available cyborg! With our RoboRoach you can briefly wirelessly control the left/right movement of a cockroach by microstimulation of the antenna nerves. The RoboRoach is a great way to learn about neural microstimulation, learning, and electronics!

The RoboRoach "backpack" weighs 4.4 grams with the battery, and each battery will last over a month! Following a brief surgery you perform on the cockroach to attach the silver electrodes to the antenna, you can attach the backpack to the roach and control its movement for a few minutes before the cockroach adapts. When you return the cockroach to its cage for ~20 minutes, he "forgets" and the stimulation works again. Once you receive your RoboRoach in the mail, follow our online surgery instructions and videos and you will soon be on your way to becoming an expert in neural interfaces. After about 2-7 days, the stimulation stops working altogether, so you can clip the wires and retire the cockroach to your breeder colony to spend the rest of its days making more cockroaches for you and eating your lettuce." (632)

From 1959 until 1962, Henry Murray conducted unethical stress tests on 22 Harvard students. The students were told they would be debating philosophy with other students, but instead they were subjected to purposely brutalizing psychological experiments under bright lights while being observed through a one-way mirror. The unwitting students were subjected to what Murray described as, "vehement, sweeping and personally abusive." One of these students was Ted Kaczynski aka The Unabomber. Were these experiments instrumental in creating the Unabomber ultimately instilling his belief in the evil of science? (269)

Some think that GMO technology should be used to create or destroy flora and fauna species *Homo sapiens* deem beneficial or harmful, but these genetic approaches to combat what some *Homo sapiens* deem as pests could have severe impacts on the natural world and even have severe evolutionary costs. What affects this will ultimately have on the natural world and other species has yet to be determined, but nature will most likely find a workaround as it always has in the past making the efforts futile. Genetically modified mosquitoes have been developed to combat the spread of dengue fever, (43) and scientists genetically engineered malaria-resistant mosquitoes in 2010. (44) In 2016, Oxitec Ltd. produced a genetically engineered line of the *Aedes aegypti* mosquito which have a self-limiting gene and have also been modified to make the female larvae self-destruct before they can mature. A similar effort is underway in an attempt to suppress reproduction in the invasive *Plutella xylostella* moth. (350) In November 2017, the EPA registered a new mosquito biopesticide which infects the *Aedes albopictus* mosquito with a strain of *Wolbachia* bacterium which then is passed to the offspring and kills them. (601) Could this technology be beneficial by removing invasive species from ecosystems? Or could it have unforeseen adverse effects on the environment and other species?

There are 3,500 species of mosquitoes which have been classified, but human malaria is transmitted only by the females of only 30-40 species. (431) And yet there are some who support the Frankenstein idea of making all or

some mosquito species extinct. Many *Homo sapiens* lack the knowledge or even the willingness to truly learn about nature, and therefore cannot comprehend nature fully. This is evident in the mentality of those who want to do things like eradicate all mosquito species from Earth because they believe all mosquitos spread disease. These individuals are not aware of the facts, nor do they see the near impossibility of this feat, much less the major rippling effect it would have on the entire natural world. Side effects of this type of brutish mentality can be seen in the DDT campaigns of the mid-20th century which left a toxic legacy in ecosystems throughout the world. Will emerging science and technology one day make these Frankenstein ideas, like that of mosquito eradication, a reality? What effect would every mosquito going extinct have on the ecosystems and those species which rely on mosquitos as a food source? Could selectively making unwanted species extinct cause a sudden major collapse in the natural web of life, and help to trigger a mass extinction? The solution to the self-inflicted environmental problems like insect pollinators dying off is not robotic insects or drones to replace real insects as pollinators, but instead to find the anthropogenic cause of the insect die-off and prevent it at the source permanently.

An estimated 1/3 of the world's males are circumcised, and while circumcision has been associated with reduced cancer rates, HPV, HIV, and UTIs, a clear medical benefit has never been established. The painful and permanently scarring procedure is often performed, not for medical purposes, but as a religious tradition in some cultures on helpless infants which have no rights, and no choice in the decision. In addition, as a result of male chauvinism, in an attempt control women's sexuality and misconceptions about purity, modesty, and beauty, an estimated 100,000,000 to 140,000,000 women alive today have been subjected to female genital mutilation, many of them cut before the age of 5. (413) Potential bleeding, infection, and negative psychological impacts are possible complications. What right does someone else have to permanently mutilate another *Homo sapiens* genitalia for religious traditions and at such a young age? Will these perverse antiquated traditions ever be abandoned?

Geoengineering or climate engineering is one of the maddest scientific attempts recently in an futile attempt to mitigate, and even try to reverse the effects of global warming. These geoengineers are proposing ludicrous Earth altering solutions like adding iron dust to the oceans, in order to promote rapid plankton growth, or even injecting sulfate particles into the upper atmosphere. Adding more unneeded and unwanted things in an attempt to reverse anthropogenic activities will never be the solution. These ludicrous solutions would be ineffective in making any real difference and could do more harm than good, and ultimately result in a more polluted Earth. Attempts have been made to control the weather by seeding clouds with silver iodide, lead iodide, potassium iodide, carbon dioxide, or liquid propane. Two United States government funded attempts Project Stormfury and Operation Popeye (1967-1972) were both focused on this objective. China has a special division, called the Beijing Weather Modification Office, that has 30 aircraft, 4,000 rocket launchers and 7,000 anti-aircraft guns, and employees 37,000 reservists who fire thousands of various chemical rounds into clouds attempting to control the weather in and around Beijing, and these methods were even used to prevent rain during the 2008 Olympics. (224)

Using Frankenstein science in an attempt implement pseudo solutions, like geoengineering polar glaciers to slow sea-level rise or genetically modifying corals to withstand a warmer climate, will never resolve the issues fully, and these hare-brained schemes will most likely do more harm than any good at all. When scientists came forward decades ago, and told the world about issues like, global warming or how plastic was contaminating the Earth, the government should have immediately stepped in and made corporations change their destructive ways. The government should have enacted laws, which stopped corporations from manufacturing oil powered automobiles and forced them to create electric automobiles instead. They should have made power companies use solar and wind instead of using oil and coal to generate power, and they should have made them use bioplastic instead of toxic plastic. This should not have been a slow process, which has now taken more than 50 years to even begin, it should have been done rapidly, and changes should have been implemented within years as was done with the ozone hole. Had the governments of the world not failed the citizens of Earth with inaction, much of the damage which has been done over the last 50 years could have been avoided entirely. And if governments do not stand up to corporations and protect the Earth now, then there will most certainly be unavoidable damage in the future.

Using eugenics in any form will only lead to loss of genetic diversity and selection based on what whomever is in power at the time deems to be superior. Natural selection and evolution by natural processes has worked for billions of years perfectly, nature invented the laws and processes of the game of life and will therefore most likely always be superior at it.

Cloning and Resurrection Biology

Homo sapiens have created thousands of different sub-species of dogs, cats, horses, and other fauna utilizing cross-breeding, selective breeding, and breeding back techniques. But now, new technology and scientific advancements have made theoretical cloning an actual reality. The brothers Heinz and Lutz Heck attempted the first resurrection science trying to bring back the extinct tarpan and aurochs in the 1920's. Since then de-extinction has only become more possible with scientific and technological advancements. In 1973, Frostie, the first calf was born from a previously frozen embryo, then in 1996, using the process of nuclear transfer, and after 277 attempts, scientist successfully cloned a sheep named Dolly. Over the last 20 years, scientists have successfully cloned a camel, coyote, deer, Pyrenean ibex, brown rat, Arctic wolf, rabbit, carp, cats, cattle, dogs, fruit flies, goats, horses, mice, monkeys, mules, pigs, and sheep. The Pyrenean ibex was declared extinct in 2000, but using DNA from a skin sample taken before the Pyrenean ibex went extinct, scientist replaced the genetic material in the eggs from a domestic goat. This was the first time an extinct animal had been cloned, although the cloned Pyrenean ibex died shortly after birth from physical defects in its lungs, similar to other previously cloned animals which have also been born with lung and other defects. In February 2017, it was reported that geneticist George Church at Harvard University had so far spliced 45 mammoth-like edits of DNA into the endangered Asian elephant genome, in an ongoing effort to resurrect the extinct woolly mammoth. The cloning of a woolly mammoth has been justified as an alternative future for the endangered Asian elephant, and possibly to combat global warming, in which Church asininely remarked, "They keep the tundra from thawing by punching through snow and allowing cold air to come in," (369) Even using breeding back techniques like those for the Quagga Project, which has only created zebras that optically resembles the extinct quagga, will never work in bringing back an extinct species and will almost certainly only further disrupt the natural balance in ecosystems.

Cloning has been justified by some as an ethical duty to redress past mistakes, but couldn't cloning perhaps make those mistakes even greater? Is attempting to redress past mistakes worth the possible permanent negative impacts that could also arise? Would it not be more logical to work in the present and focus on the future while remembering and learning from the past, instead of trying to change what has already happened? As the ecosystems have changed drastically since the species being cloned went extinct, could reintroducing the extinct species perhaps have a negative impact on an ecosystem that has evolved without the extinct species? Or could the extinct species fail to thrive as the ecosystem has changed since it last lived? Is it not best to leave evolution and extinction to the laws and natural processes of nature, instead of attempting to play God and control the evolution and extinction of flora and fauna? What negative impacts could resurrecting extinct flora and fauna have on living flora and fauna? Could this introduction disrupt or bring permanent imbalance to an ecosystem? Could biodiversity be impacted? With so many extant species in need of attention and conservation, should the focus be more on preserving what remains and not a species that was evolutionarily lost thousands or millions of years ago? Why do *Homo sapiens* have such a hard time in accepting change, death, and ultimately the laws and processes of nature? Why can't *Homo sapiens* simply change themselves and the world around them?

Coexisting with Science and Technology

Vinyl records, 8track tapes, cassette tapes, CDs, and DVDs were consumed in mass quantities until their near replacement recently with MP3s and other digital media. This is one example of how technology can be good in that it replaced all of these and has made them virtually obsolete, except to the nostalgically minded and collectors. Technology has also helped the environment in other ways from telecommuting, to a growing paperless world. In 2014, MIT scientists created a new powerful glue using the adhesive property genes from mussels and bacteria. This biodegradable glue is extremely strong and is a good example of learning from nature and

creating a natural alternative to replace the toxic one currently being used.

Some manipulative science will ultimately lead to a God complex by those who control it, and often it will even lead them into thinking that the problem has been solved, when in actuality, the solution has only created more problems. Science that alters the natural processes could be considered by some as only fixing what is broken in *Homo sapiens*, but one should also ask how did it get broken in the first place? Is it broken as a side effect from something *Homo sapiens* did to itself? Perhaps *Homo sapiens* should attempt to correct the adverse reactions to their past mistakes, but only if the past mistakes have been corrected, otherwise it is pointless. (e.g. if a toxic chemical causes cancer, using medical treatments to cure the cancer may work, but it will not be truly cured if the toxic chemical is still prevalent and causing cancer, the true cure would be to eliminate the toxic chemical) One could argue that, as soon as one begins manipulating *Homo sapiens* DNA or genetics in order to prevent diseases or make a child the way the parents want it, (e.g. hair color, eye color, boy or girl, etc.) that one has effectively played God and while also taking the meaning out of life with all its mystery and chance, and perhaps even taking away some of what it means to be human.

Artificial insemination, prescription drugs, and other methods are practiced by *Homo sapiens* on themselves and other faunae in an attempt to force procreation. But what should also be considered, is that some *Homo sapiens* just aren't physically able to have children. And while there can be environmental factors which cause this, it is ultimately nothing more than a result of evolution and more specifically that of natural selection. Should *Homo sapiens* interfere with evolution? Could interfering cause a future genetic weakness or other side-effect in future *Homo sapiens*? If a *Homo sapiens* cannot procreate, because of infertility or inability to conceive, should scientific intervention be done to resolve the issue? Is this not going against evolution and natural selection? If something is not naturally possible, is it wise to pursue it and go against nature? Some might even argue that *Homo sapiens* depredations are only simply another part of evolution, but unfortunately, the connection to Earth and nature is what *Homo sapiens* appear to have sadly lost during their evolution.

There are many ethical questions that science is no doubt facing. How much alterations with science before birth and during a lifetime is acceptable? Do *Homo sapiens* have the right to change another *Homo sapiens* before they are even born? Have *Homo sapiens* begun to influence and alter the evolutionary path of not only their own species, but of Earth itself with science and technology? Will science and technology create a new evolutionary path for *Homo sapiens*? Or is this something that only nature can do? Is it too late for *Homo sapiens* to change? Or is change an impossibility at this point, have too many *Homo sapiens* entered into a black hole of greed and control utilizing technology and science? Could one of these lunatics possibly even triggering the extinction of *Homo sapiens*?

There are no doubt thousands of other Frankenstein experiments than those listed here which continue even today. Until there are strict rules and standards set forth by the entire world scientific community, ones in which all scientists adhere to 100%, there will undoubtedly continue to be a minority of scientists that will engage in some form of Frankenstein science with governments and corporations in their attempts to control nature or some aspect of society. Do *Homo sapiens* have enough knowledge and experience to be playing God so easily? Irresponsible use of certain scientific discoveries and inventions have already led to the extinction of some other species. Will some scientist in the future make that one fatal mistake leading to the extinction of *Homo sapiens*? George Sarton wrote,

"Men of science have made abundant mistakes of every kind; their knowledge has improved only because of their gradual abandonment of ancient errors, poor approximations, and premature conclusions." (591)

As intelligent as most scientists, and with all their inventions and discoveries, can they not see the scientific brilliance with which the Earth was created, and simply respect this? Or perhaps, it is that they do, and want to change it and play God. Either way, their actions are the most depredating of all to Earth, and often with unknown and sometimes known and even accepted side effects of their activities. One can say it is all being done in the name of science and to promote growth of *Homo sapiens* as a whole species, but at what cost? Can *Homo sapiens* not slow down and thoroughly examine the science before proceeding? One could argue that if a scientific method was created or discovered it should be used and taken advantage of, no matter the cost even if

they outweigh the benefits. Science is good and beneficial with knowledge, but only if it does not negatively affect anything else on Earth. Scientists and the politicians and businesses who lead and fund them, must take responsibility and be held liable for all their actions, past, present, and future, and the consequences of how those actions could affect the world now and possibly in the future. All science is delicate in every aspect, even discovery science, but science that has the potential to alter the natural course of things is especially dangerous, and therefore it should be closely monitored to help determine which direction and approach to take. Dr. T. Colin Campbell, Ph.D. wrote,

“We oversimplify and disregard the infinite complexity of nature.” (637)

When used responsibly and ethically modern medicine, science, and technology can have a positive impact on society, and many lives have in fact been saved and extended through it. Technology and science can either be used in a positive or negative way. One scientist could use technology and science to figure out the genome of Neanderthals and other extinct Hominid species in order to unravel the mystery of *Homo sapiens* evolution, not altering anything, simply researching. Another scientist could use this same technology to modify the genome and genetically engineer *Homo sapiens* to a model of perfection as seen through the parent, scientist, or politician’s eyes. If *Homo sapiens* play God with genetics thus altering the evolution of *Homo sapiens* creating what the parent, scientist, or politician defines as perfection, this could lead to detrimental consequences for all *Homo sapiens* as a species, and possibly even extinction from an unforeseen mistake. *Homo sapiens* do not know enough about nature, life, or even the universe itself to play God, and to attempt to could be foolish and disastrous.

Like the sun going supernova or an extraterrestrial object impacting Earth, all flora and fauna species are at the mercy of something else in the universe. Likewise, the florae and faunae of Earth have no control in what *Homo sapiens* choose to do, they cannot protest or fight back, they can only simply evolve attempting to survive in the negative environment created by *Homo sapiens*. Nature will survive in the end in some natural form, this is truly the only path of evolution that *Homo sapiens* should be considering at this stage in their evolution and with such a limited scientific understanding about nature, life, or the universe. Science and technology can coexist in harmony with nature, but only if those practicing the science and utilizing the technology are responsible and have a strict moral standard they follow. A standard which is based foremost on the coexistence with nature, and not one based on exploitation through depredation.

CHAPTER VI.

The Conservation of Earth

Conservation

During the 872-day Siege of Leningrad, among the more than 4,000,000 *Homo sapiens* which died, there were most likely the first conservationists to give their lives for the preservation of nature, when M. Shcheglov, E. Vulf, A. Korzun, G. Kreier, L. Rodine, G. Kovalevsky, O. Ivanov, N. Leontjevsky, A. Malygina, A. Shchukin, and others slowly starved to death while preserving the Vavilov Institute seed collection from thieves, rats, and other forms of destruction. A collection which contained corn, pea, rice, and wheat seeds that could have easily fed them, but were instead preserved and later used to grow crops which fed the starving inhabitants of Leningrad which survived the siege. In May of 2017, the deep-freeze Svalbard Global Seed Vault which holds more than 500,000,000 flora seeds from more than 930,000 varieties and is designed to be impregnable, flooded as a result of global warming which is causing the Arctic to warm and the snow to there to melt. And although no seeds were lost, it serves as an example of how conservation efforts can potentially fail as a result of the very thing which is trying to be preserved, nature itself.

The first conservation during the 1800's in the United States was mostly based around saving wildlife so that it could continue to be hunted or exploited in other ways. Now some modern-day conservation efforts seem to place more of an emphasis on the economic value of nature and Earth rather than for scientific and moral reasons. Should conservation be based on how much money nature and ecosystems can create from exploiting the natural resources or tourism, or should it be based on the premise to conserve and protect the Earth for its beauty, and more importantly its ability to enable all life on the planet including *Homo sapiens*? If conservation is based on conservation and not on economic factors, it will be true conservation, otherwise it will always be for sale. If conservation always has an economic basis as the main factor, and systems like cap and trade are used instead of true conservation action, conservation will continue to be about what is for sale and not about truly preserving Earth by eliminating what is causing the destruction at the source. Conservation is a vital part to maintaining a stable society, and it should be done through education while being reinforced with environmental legislation which requires not only businesses, but individuals to obey laws which truly protect the environment. These laws will protect Earth if they are strictly enforced by the justice system, as they do with other laws which protect society from other negative things.

The vast majority of *Homo sapiens* cannot be entrusted to be stewards of Earth, this is plainly obvious when one looks at society and the current state of how most live and maintain their dwellings, the land around these dwellings, and most of the cities they inhabit. Some *Homo sapiens* pollute at will around their dwelling when attempting to create an aesthetically pleasing lawn by dumping chemicals directly onto the Earth, or by constructing a dwelling made of non-biodegradable materials which slowly leeches the chemicals and pollutes over thousands of years. If *Homo sapiens* continue to allow their ideologies to compromise logic, then conservation will most likely forever be a challenge in the future. Conservation and coexistence is a conscious choice made through education, forethought, and logic by every individual living a less impactful lifestyle, by choosing to consume less, to be vegan, to make as little impact as possible when doing everything, to buy products made from natural materials, and by simply living more naturally. Professor George E. Dawson wrote,

"Men ignore Nature's laws in their personal lives. They crave a larger measure of goodness and happiness, and yet in their choice of dwelling places, in their building of houses to live in, in their selection of food and drink, in their clothing of their bodies, in their choice of occupations and amusements, in their methods and habits of work, they disregard natural laws and impose upon themselves conditions that make their ideals of goodness and happiness impossible of attainment." (690)

There is a very small portion of Earth which has been set aside as parks or other protected areas. In the 2016 Protected Planet Report, the United Nations Environment Programme reported that, less than half of the 823 terrestrial ecoregions in the world have at least 17% of their area in protected areas, and only 1/3 of the 232 ecoregions in the world have 10% of their area protected, while less than 20% of Key Biodiversity Areas are

completely protected. Less than 15% of the world's terrestrial and inland waters and 4% of the global ocean are covered by protected areas. (505) The September 2016 National Geographic Magazine noted that the countries of the world have created more than 229,000 protected areas covering more than 13,000,000 square miles of land and water, an area larger than Africa, which is 11,730,000 square miles. Is it not pointless to set aside one area and say this is protected don't contaminate it, while the rest of Earth is destroyed, should not all the earth be conserved and protected equally? *Homo sapiens* must stop procrastinating when it comes to conservation, nor can it be done gradually by only a few, conservation is something that must be done now and quickly by everyone on Earth. Martin Luther King Jr. wrote,

"We may cry out desperately for time to pause in her passage, but time is deaf to every plea and rushes on. Over the bleached bones and jumbled residues of numerous civilizations are written the pathetic words: "Too late."'" (231)

Some think that conservation is nothing more than protecting an area by making it a preserve, park, or whatever name suits it, that nature is protected from the direct outside influences of *Homo sapiens*, but this is far from true. A 2018 study found that 1/3 of global protected land is under intense pressure from *Homo sapiens*. The study remarked that,

"In an era of massive biodiversity loss, the greatest conservation success story has been the growth of protected land globally. Protected areas are the primary defense against biodiversity loss, but extensive human activity within their boundaries can undermine this. Using the most comprehensive global map of human pressure, we show that 6 million square kilometers (32.8%) of protected land is under intense human pressure. For protected areas designated before the Convention on Biological Diversity was ratified in 1992, 55% have since experienced human pressure increases. These increases were lowest in large, strict protected areas, showing that they are potentially effective, at least in some nations." (90)

The florae and faunae for the most part is protected, and more so than if nothing at all were done, but the footprint on these ecosystems from *Homo sapiens* depredations still exists in even the most remote locations. For a good example of this one need only view, The Nature Explorers 'Homo sapiens Depredations of Series 3, 4, and 5 Expeditions Raw Footage' <https://www.youtube.com/watch?v=tnK5ETUofAI> The amount of trash encountered in these remote ecosystems is staggering. During the 35 expeditions of the Western North American ecosystems, I filmed over 2,000 shots of *Homo sapiens* depredations done throughout the ecosystems, and there was always far more than what I filmed. I am not sure what resources government agencies allocate to cleanup, but it is most likely focused on the campgrounds, monuments, and other highly trafficked areas and not the remote wilderness areas where I explored.

Unfortunately, the national and state parks, BLM lands, national forests and grasslands have far too few environmental law enforcement officers and cleanup crews which they desperately need. Many of the federal government employees who work directly on these lands and most of the hunters, backpackers, hikers, weekend warriors, and other visitors ignore the trash as they do in cities. Do they not notice it? Why do they choose to ignore it when it is so blatant, especially in nature? Why don't more park service employees, hunters, backpackers, hikers, weekend warriors, and other visitors to these remote areas not pick up trash when they see it? What good is a park or protected area if visitors treat it with such disrespect and thoughtlessness with their litter and destruction of the florae and faunae? Why can't more follow the simple ethics of 'Tread Lightly' and 'Leave No Trace'? These are principles which could be taught to all *Homo sapiens* from childhood while they are learning to respect nature and to coexist with everything on Earth.

The majority of U.S. National Parks, Forests, and Grasslands are around 100 years old, and this shows how conservation efforts have had to resort to forcibly protecting nature, in part, because most modern-day *Homo sapiens* have not been instilled from youth to simply respect nature and coexist. Although the United States has many national parks, forests, and grasslands, they are still not fully protected. The United States National Forest system has been severely exploited for lumber, minerals, hunting, and grazing livestock. As of 2017, cows were still being allowed to graze in some of the United States National Forests and BLM lands destroying flora species, some even endemic, and causing other environmental destruction. What good is protecting an ecosystem if outside anthropogenic influences like global warming and pollution can destroy the protected ecosystem? Do most *Homo sapiens* want to protect nature, but don't want to change because that would include the realization that their lifestyle and habits might be the main cause for the destruction in the first place? Doesn't the

environment and the natural resources that everyone depends on not deserve the utmost protection?

Using technology towards their advantage no ocean, forest, desert, tundra, swamp, or other ecosystem no matter how remote has escaped the depredations of *Homo sapiens*. There are hardly any truly pristine areas of Earth that have not been encroached on by *Homo sapiens*, even within the areas which have been set aside for conservation. *Homo sapiens* depredations are becoming ever more prevalent with more and more hunters, backpackers, car campers, extreme outdoor sports enthusiast, and weekend warriors than in years past, which means even greater negative impacts on these once pristine ecosystems. Campsite firepits are used by many for the disposal of trash which often includes plastic, aluminum cans, and other things which are tossed into the fire and melted or singed, ultimately contaminating the atmosphere, soil, and water. Although there are rules, laws, and even signs to discourage litter many visitors simply ignore them, and litter at will the same as they do in the cities they inhabit. The national parks, forests, grasslands, and BLM lands cover such a vast area that it would be a massive undertaking to clean them, and it could perhaps do further damage if those picking up the trash were heavy-handed in these remote ecosystems.

Too often, freedom is used to justify *Homo sapiens* depredations. Some *Homo sapiens* want the freedom to do anything they choose and believe that they have a right to be free and do anything they want without any consideration for not only their fellow *Homo sapiens*, but other flora and fauna which also inhabit the planet as well. One can say that they want true freedom, freedom to do as they wish, and these freedoms might also include the destruction of Earth, (e.g. via fertilizing their pseudo perfect lawns, using as much electricity and water as they want, generating as much waste as they want, driving their car when they want, killing faunae for sport, etc.) but at some point there will be worldwide legislation enacted for the well-being of all of Earth, which ultimately will help to protect *Homo sapiens* from themselves. There are already many negative things which are deemed as crimes and are not allowed by law, some of these are strictly enforced around the world. Do not the other species which also inhabit Earth not deserve the same protections as *Homo sapiens*? If *Homo sapiens* disregard the other species of Earth and depredate the Earth in the name of self-preservation, is this truly self-preservation, or self-destruction? Martin Luther King Jr. wrote,

“From time immemorial men have lived by the principle that “self-preservation is the first law of life.” But this is a false assumption. I would say that other-preservation is the first law of life. It is the first law of life precisely because we cannot preserve self without being concerned about preserving other selves. The universe is so structured that things go awry if men are not diligent in their cultivation of the other-regarding dimension. “I” cannot reach fulfillment without “thou.” The self cannot be self without other selves. Self-concern without other-concern is like a tributary that has no outward flow to the ocean. Stagnant, still and stale, it lacks both life and freshness. Nothing would be more disastrous and out of harmony with our self-interest than for the developed nations to travel a dead-end road of inordinate selfishness. We are in the fortunate position of having our deepest sense of morality coalesce with our self-interest.” (385)

Some *Homo sapiens* seem oblivious with regard to conservation and even scientific evidence, and time seems to have no effect in dissuading them from their current paths of destruction. Most *Homo sapiens* have an anthropocentric attitude, and this is the one of the main causes for so many depredations and the justification of them. Some *Homo sapiens* who depredate Earth, base their actions on some fact like that the Sun will destroy the Earth in a billion years anyway, so why bother preserving anything anyway? Or God gave *Homo sapiens* Earth and everything on Earth to use as one pleases. Or the Earth is infinite and so are its resources. Or their God will magically heal the planet if things get too bad if they simply pray. Or economic growth and the prosperity of humanity is what matters most. If *Homo sapiens* are educated more and made aware of the real issues facing planet Earth, will these negative mentalities become non-existent in the future? It is important to also consider the microscopic level, and not only the macroscopic level, when the problems and solutions towards the conservation of Earth are considered.

Natural resources are finite and *Homo sapiens* are extracting more and more every day and wasting so many of these precious natural resources on senseless things. Should not natural resources be extracted, used, and recycled wisely to ensure they are available for the future? The way natural resources are viewed by many, especially businesses and governments, is not from a conservation standpoint, it is from a commercial and exploitive one, if it is not used it is going to waste, is their mindset. Some *Homo sapiens* regard nature and the resources it contains as expendable, they think that no matter how much is taken there will always be more,

because the Earth is infinite in size and resources. Other *Homo sapiens* appear confident that things can continue as they are, that improvement is gradually happening and with the small changes being made this will fix everything, nothing really bad has happened yet and probably never will, is their mentality. But these stances of ignorance do nothing more than delay the inevitable reality that the Earth does have limits, and negative anthropogenic impacts have happened and continue to happen, and this needs to be corrected rapidly.

Homo sapiens are the only species known to have been created with an intellectual brain, unlike true wild faunae, in the sense that *Homo sapiens* can think and create more than any other species on Earth. Therefore, one might postulate that with such great intelligence and power also comes great responsibility. So why then do *Homo sapiens* not only destroy themselves, but so many other species around them senselessly? One can easily look at *Homo sapiens* and define them as parasitic and by no means symbiotic with the majority of other florae and faunae of Earth. One might logically think that the most intelligent species would see the error of their ways, past and present, and use this to shape a more balanced future instead of senselessly repeating so many of the past mistakes. If *Homo sapiens* continue down the current path of destruction is it not from lack of knowledge, for it is scientifically well known and proven at this point that what has been done and is currently being done is incorrect, it will be simply from a lack of morals and will power to change. Would not a combination of science, logical thought, respect for all living things on Earth, and simple indigenous type lifestyle with a small footprint be the most logical method to achieve a state of coexistence not only with other *Homo sapiens*, but with all species on Earth?

Casualties of the War on Nature

Between 2002 and 2013, there were 908 *Homo sapiens* in 35 countries murdered because they were either an environmentalist attempting to save the Earth, or they were citizens protecting rights to their land and the environment. 147 of these murders were in 2012 making it the deadliest year on record. (417) The world has an estimated 40,000 park rangers which protect wildlife refuges, national parks, and other wildlands, (415) between 2005 and 2015 there were 800 park rangers killed by commercial poachers and armed militia groups in addition to thousands of community members which were also killed. (416) Should not these natural areas receive more protection? Why is this war on nature not a focal point in the mainstream news media like the Iraq, Afghanistan, and Syrian wars?

Quasi-Conservation

There are many contradictory environmentalist and conservation groups which appear on the surface as wanting to help conservation efforts, but in reality, they lack discipline, education, or morals, and this can be seen in what they say and in what their actions actually are. Many make excuses or procrastinate when it comes to changing their lifestyles, they say they are prisoners of society and there is not a choice. Some *Homo sapiens* talk about conservation and saving earth, and yet they still engage in a plastic lifestyle, wearing plastic clothes, using plastic things, perhaps some may use less and partake in the illusion that it is somehow better, but in the end it is not true conservation. (e.g. a consumer buys a heavy-duty plastic bag for shopping, while it is good the consumer is not using the free plastic bags anymore and using far less plastic, the heavy-duty bag is ultimately still plastic, whereas true change would be to utilize a more durable, longer lasting, all-natural cotton, hemp, or other bag woven of natural fibers, and thus being truly conscious of what one is consuming and how it will negatively impact the Earth around them) Some companies are even engaged in greenwashing or the false marketing of eco-friendly products when in fact they are not, they are just products which are made in an eco-friendly manner by using less power consumption or less materials, but in reality, they are still made of toxic chemicals and destroy the Earth. Many eco-friendly products and even much of the vegan food sold in stores is packaged in toxic synthetic plastic and is another good example of greenwashing.

Efforts by some to repurpose plastic for other uses is nothing more than a conservation contradiction. (e.g. recycling plastic into structures by filling coke bottles, car tires, plastic bags, or other plastic containers with soil, sand, or other medium, all the while still using plastic and in fact allowing even more of Earth to be exposed to the plastic for a longer period of time) Repurposing toxic plastic into other things is never the solution, using

stone, wood, clay, bamboo, and other natural building materials like has been done for thousands of years and is still done by some around the world even today. This is the way to construct everything, while also practicing less consumption, and ultimately eliminating all toxic plastic and replacing it with 100% bio-degradable plastic, these are permanent solutions.

Some protect nature for their own selfish reasons, or because they are obsessed with a particular species of flora or fauna, their mentality is, '*Let everything else die, but save this species or that species because it's beautiful or the young are so cute and adorable.*' But this mentality can often be fatal for all other species which also inhabit the ecosystem, as conservation is about the entire ecosystem and not just one species. Brian Walker wrote,

"Conservationists should spend less time worrying about the persistence of particular plant or animal species and begin to think instead about maintaining the nature and diversity of ecosystem processes." (636)

Many efforts to rescue faunae or attempt conservation are futile, and some conservationists are so extreme they seem like they are out of the Futurama '*The Birdbot of Ice-Catraz*' episode. What is the point of rescuing flora and fauna if the environment is too toxic to inhabit? Wouldn't time and resources be more effective if they were focused on eliminating the cause of the destruction, and thus preventing the issue from occurring and ultimately eliminating the need for rescue and forced conservation? If left alone nature will rescue itself, it does not need any intervention by *Homo sapiens*, in fact it usually needs the exact opposite, to be simply left alone and coexisted with. If *Homo sapiens* begin to focus more on educating and changing themselves and are focused far less on rescuing nature, then things would most likely be much better off. If *Homo sapiens* clean up the toxic mess they have created and stop interfering with nature and the natural process and allow Earth to heal on its own, it will most likely heal far more rapidly. True conservation can only be achieved by ensuring the ecosystem is habitable for all species by protecting it from anthropogenic threats, and this is accomplished by eliminating these threats completely at the source.

Attempting to wipeout Sylvatic plague by vaccinating prairie dogs and spraying pesticides on rodent dens is just one extreme conservation technique employed in an attempt to fight and control nature and the natural path of evolution, which has already been altered too much by *Homo sapiens* depredations. Another is the sexing of turtles through the use of a vibrator to stimulate male turtles into everting their penises, as it is very difficult to determine the type of sex a turtle is, even within dimorphic species. (457) When scientist begin using a vibrator to sex a turtle, some might infer that conservation has gone too extreme. Can *Homo sapiens* simply stop eating turtle eggs and destroying turtle habitats, and then allow the turtles to procreate naturally, instead of trying to conserve turtles through extreme sexing techniques? Has nature not displayed perfection when it comes to reproduction? Does nature really need any help with reproduction from *Homo sapiens*? What good are captive-breeding and release conservation efforts if the species is released into a toxic ecosystem, will continue to be hunted, or other anthropogenic activities will somehow negatively impact the species? Letting nature evolve on its own without interference is perhaps one of the best methods for conservation *Homo sapiens* could practice, otherwise they could perhaps do more harm than good.

Saving a species of fauna which has been injured only to allow it to live in captivity, is one of the most bizarre side effects from anthropomorphism. If allowed to die, the natural process of life can happen instead of being delayed and wasting vast amounts of resources and time which could be allocated to helping prevent the possible anthropogenic cause of the faunae injuries. Many times, failed rescue efforts end up killing the captive faunae which are being rescued, sometimes more horrifically than would have happened without intervention. In 2016, concerned citizens and a group called iRescue Wildlife, Inc. attempted to rescue a 15-pound lobster from a seafood restaurant which was estimated to be at least 60 years old. The lobster was shipped to the Maine State Aquarium via FedEx, only to be returned, the lobster was shipped again in a Styrofoam package with frozen gel packs and was found dead on arrival by the aquarium staff, and it was in fact the stress and being initially packaged with freshwater ice which were thought to have caused the lobster's death. (554) Would not a more logical conservation action be to find a way of ending the consumption of lobsters, instead of trying to rescue those already captured?

In 2015, many in the western world were upset when Walter Palmer killed the iconic lion Cecil, many spoke out,

laws were even proposed, and the U.S. Fish and Wildlife even added two subspecies of lion to the endangered species list. Pointless this action and uproar appeared to most, as Cecil's 6-year-old son Xanda along with several young cubs were shot and killed in July 2017 by another trophy hunter. (425) Where was the international media attention and public outrage for the millions of other lions, elephants, rhinoceroses, and other African faunae which have been hunted to near extinction over the last 200 years during the conquest of Africa? Why does it always seem to take some dramatically publicized incident to get the public to see the reality of the situation and to actually begin care?

Charities make many *Homo sapiens* feel good and that they have done their part, perhaps even relieving their conscience of guilt, and while most *Homo sapiens* would rather give a few dollars to some cause they deem worthy, far more progress would be achieved if everyone got involved and helped with real world actions. "*I gave so now I am good, hope it all gets better good luck with your problem,*" is their mentality, but in reality, actions speak louder than words and money. How much better would the world be if more *Homo sapiens* got involved with the issues directly rather than just simply throwing money at it? In 2015, American individuals, foundations, charitable bequests, and corporations gave \$373,250,000,000 in charitable donations. Individuals gave the most at \$264,580,000,000, foundations \$58,460,000,000, charitable bequests \$31,760,000,000 and corporations \$18,450,000,000. (378) Why do corporations make the most money and yet give the least? How much of these donations were misappropriated, spent recklessly, or wasted in other ways?

Solving any issue through violence, destruction, or any similar negative actions is never the solution, and eco-terrorism in any form cannot be tolerated. Positive change comes from within the system not from futilely attacking it from the outside. Positive change comes from education and being shown by example, and it happens when society as a whole, recognizes the issues and initiates change from feeling passionately about them, and this happens through simply being exposed to the truth, not from instilling fear through terrorism and destructive acts. Using alarmist tactics in an attempt to create environmental paranoia by exaggerating the reality of the situation is neither the way to gain support for conservation. Environmental paranoia and terrorism only portrays conservationists as foolish extremist who lie about reality, and it gives anti-conservationists more clout. There is no place in modern society for terrorism, revolution through revolt, or fearmongering, these were perhaps the methods used in the past, but today society has democracy, and through truth and democracy the system has, can, and will continue to change. Environmental issues can be resolved through education and civil-societal pressure on governments to enact reforms, and this has been demonstrated in the past. All *Homo sapiens* are capable of change, and most truly want to change, but they simply lack the education and guidance, or they have perhaps been guided towards quasi-conservation lifestyles. Change can be so easily achieved by simply getting individuals to reconnect with nature, and then they will perhaps want to conserve it for this reason alone.

The Wrong Choices

There are many faux solutions being proposed for the current environmental issues, and they are actually nothing more than just additional problems to replace the current ones, whereas the true solution is to solve the issues permanently, not to create more problems for the future. The main dirty, dangerous, or non-renewable energy sources being used or developed are: nuclear, hybrid, coal, petroleum, natural gas, geothermal, hydrogen fuel, biofuel, and biomass. Many of these dirty alternatives are marketed as being clean energy sources and use terms like natural, bio, or geo which sound eco-friendly, but in actuality they are not. In order to produce these dirty alternatives vast amounts of energy and water are required, they are dangerous to use, and they pollute the environment in some manner usually with a by-product. Simply put, they are dangerous and toxic sources of energy which require excessive amounts of work and processes in order to be utilized.

Some of these dirty alternatives are perhaps good in the sense that they are naturally created process which can be tapped, like the capturing of methane gas from landfills. But if landfills were properly managed and organic waste such as food waste went back into the soils of Earth instead of accumulating at landfills creating methane gas, perhaps there would be far less methane by-product. Using by-product waste could perhaps be justified to some extent, as it puts methane as a landfill by-product to good use, but to extract methane from the Earth for fuel purposes is as senseless as all other biofuels. Why grow wood or food crops simply for the purposes of

creating biomass to consume as a biofuel? Why use a toxic energy source that pollutes the Earth when consumed? Why attempt to create energy using dirty sources, when nature surrounds you with it in the abundant endless clean forms of solar and wind energy? Why not eliminate the problem entirely by not using dirty energy sources at all, and instead utilize 100% clean solar or wind energy sources? If the source of energy or materials for products, (e.g. coal, biomass, gas, petroleum, nuclear, synthetic chemicals, etc.) has any potential to damage the Earth or *Homo sapiens* in any way, shouldn't that source be abandoned entirely to avoid all possible contamination? Why even attempt to manipulate such sources when there is perfectly endless and clean energy available from the sun and wind? These clean energies require no mining, water injection, drilling, are not dangerous during use, and do not require any harmful toxic processes to utilize.

There are some who have the opinion that coal, natural gas, and petroleum can be used in lower quantities and thus be safely use, but these proposals to use hybrid cars in order to use less gas and thus maintain sustainable pollution levels, is nothing more than a temporary solution to a permanent problem. This is an extremely foolish solution when so many sources of unlimited clean energy exist, along with reliable fully electric automobiles which now exist and are 100% clean, emitting no emissions. Using food to create biofuels when it should be going towards feeding *Homo sapiens* is another solution which will have devastating consequences. The water and land resources alone that would be needed to grow fuel is so impractical, and some recent studies have also shown that biofuels are worse for the atmosphere than fossil fuels. Using biofuels is not only a dirty fuel source creating emissions during the manufacturing and consumption process, but more importantly it has been shown that using biofuels leads to a major increase in food cost for consumers eating the food which is being used as a biofuel source. The October 2014 National Geographic Magazine stated that,

“4% of the world's fuel is biofuel. Mexicans spend three times more of their income on food than Americans do. Mexico's urban poor spend an even higher share. From 2005 to 2011 the price of tortillas in Mexico rose nearly 70 percent, fueling the 2007 riots that led to government price controls. Experts estimate that increased U.S. ethanol production accounted for over 30 percent of the price spike.”

Some think that another alternative is to use biomass as a fuel instead of putting it back towards helping the soils of Earth, but biomass as a fuel consumes energy and produces vast amounts of air pollution releasing carbon monoxide, carbon dioxide, nitrogen oxides, volatile organic compounds, particulates, and other pollutants like black carbon into the atmosphere. Would it not be more productive to use biomass for the rejuvenation of soil instead of polluting the atmosphere with it? Others say that society should continue to use fossil fuels and the solution to the carbon dioxide emissions dilemma is to simply capture and sequester the carbon deep within the Earth. Carbon sequestration by means of drilling more holes into Earth and using vast amounts of water will do nothing more than disturb the Earth's equilibrium even further. Some have proposed using technologies like TiO₂ to make massive air filters to clean the atmosphere. Why not simply plant more trees and make Earth greener while also creating a more natural Carbon sequestration and filtration system? Would it not be more productive to focus all resources into researching and developing 100% clean energy sources like wind and solar which produce no carbon to sequester and are unlimited and freely available? Extremes are also being investigated by a few scientists to wire up flora to harvest energy from them, a type of living solar panel in essence. (616) Why can't *Homo sapiens* simply obtain the clean and abundant energy of the Sun? Why must they either destroy the environment or exploit other living things unnecessarily?

Although Global Dimming could have perhaps delayed an even further increase in temperature rise, it is no solution to Global Warming as some have proposed in blocking out sunlight with different Frankenstein Science ideas. Others have proposed even more ridiculous climate engineering schemes to reflect sunlight away from Earth, like painting millions of roofs white. Some think that with geoengineering they can reverse global warming by attempting to control the weather with ideas like cloud seeding, adding aluminum to jet fuel, space-based mirrors, changing the oceans color making it less dark, alter the composition of the stratosphere to block incoming sunlight, or attempt ocean iron fertilization to create blooms. These are not solutions they are nothing more than whimsical pseudo solutions proposed by idiotic individuals posing as a scientifically minded individual, and they are so blinded as to not see the potential disastrous side-effects to their ludicrous proposals. Governments are seriously considering some of these solutions as they are far less expensive than to change energy sources and reduce carbon dioxide emissions. The U.S. Congress and the U.K. Parliament are both

investigating climate engineering as a solution, governments which have some members who still deny global warming is occurring and do not want to change the current destructive methods. How can these officials still deny global warming is a hoax while at the same time relative government agencies have gathered scientific evidence and are preparing for global warming?

The United States has wilderness areas that are by far the most protected areas within the national park and forest systems. Among other strict rules which help to leave little impact on the area, no motorized vehicles are allowed including bicycles. But as nice as these areas seem with the large number of 758 and although they do protect the land within their boundaries these boundaries are far too small. Wilderness areas only account for 5% of the total land in the United States. Shouldn't this percentage be greater considering the vast amount of land that is in the western United States? Are there not ample enough beautiful pristine lands west of the Rockies to choose from? Should not the Federal Government protect more lands before they are even more encroached on and exploited? Some of the management practices of past and present done by the government are beyond imagination, like the poisoning of native fish species to make more resources for introduced sportfish, or even futile efforts like fire suppression and bark beetle management.

Implementing partial solutions for environmental issues and thus making the destruction less, should never be a justification for the continual destruction of the Earth. The permanent solution is to prevent the environmental destruction from happening initially by not engaging in the anthropogenic activities which lead or could possibly lead to the environmental destruction. Any energy source that is not 100% biodegradable and based on the renewable energy sources of wind or the Sun is useless and will only lead to future pollution and environmental destruction. Attempting to alter the current negative path to make it appear viable with things like carbon credits and other partial solutions will only prolong the inevitable and actually compound the problem. Why not solve the issues permanently with the proven solutions which have already been discovered instead of continuing the cycle of destruction? Would not the logical solution be to stop the pollution at the source and stop using the things which are causing the pollution? Is it not easier to fix self-induced problems by simply not causing them in the first place?

Creating tariffs on Chinese solar panels as was done in the United States, European Union, and India will only hinder the conversion to clean energy and make it more expensive for consumers and businesses. Converting to clean energy should never be discouraged because of supposed economic incentives, to engage in political games of tug-o-war, or in order to eliminate competitors in rival markets. If China can produce quality low priced solar panels which ultimately will help expedite the world's conversion to solar energy more rapidly then the governments of the world should be embracing this not discouraging it. Why do these same governments encourage so many other products being produced in China and yet discourage solar panels? Could this policy be an initiative brought about by pressure from the fossil fuel industry to discourage the conversion to clean energy?

The Right Choices

The sun is the most abundant energy source in the solar system raining down endless clean energy upon Earth, and this is one reason why it is the right choice for 100% clean renewable solar and wind energy. Solar and wind energy have now been firmly established as alternative and mainstream energy sources for some areas of the world, and it has been demonstrated that it can be produced cheaply and abundantly anywhere in the world, under any conditions. Renewable energy technology is rapidly advancing, and research being done in alternative fields like microbial biophotovoltaics (BPV) which uses cyanobacteria that are not only 100% biodegradable but can also produce small amounts of electricity when exposed to sunlight, and even have the unique ability to continue production in the dark. In November 2017, researchers from Imperial College London the University of Cambridge and Central Saint Martins announced they had used photosynthetic cyanobacteria as ink to print a functional bio-solar panel. (590) How much farther advanced and prevalent would these clean energy technologies be, if all the resources which were spent working on coal, nuclear, biofuel, biomass, and other dirty energy sources, would have instead been focused on solar and wind energy?

The first practical solar technology capable of converting the Sun's energy into electricity has been around since 1954, so it isn't a question of the technology being available, it is more that commercial and political issues have hindered the growth and conversion to these 100% clean renewable energy resources. If *Homo sapiens* with able finances would invest in solar on their personal properties installing systems that would over-produce electricity selling it back to the grid, this would help to not only get the solar ball rolling faster, but it would also help in putting an end to the energy monopoly which currently grips consumers. Power companies would no longer be producing all the energy, it would be produced by individuals and sold to individuals, perhaps with energy companies enact a lesser fee for supplying and maintaining the grid of power lines and storage facilities. Perhaps solar panels will be so cheap in the future that every building will have them, and the energy companies will be unnecessary entirely as far as the generation and storage of power is concerned, and their power lines will become as antiquated as phone lines have been made by mobile phones. Most solar panels are guaranteed to last for 25 years and are expected to last up to 50 years, already making them a wise investment, and cheaper more energy producing solar panels are becoming available as the technology rapidly progresses. Perhaps with more research and scientific advancements, solar panels will increase in power output and decrease in size exponentially. Smart highways are another area which could use far more research and funding and should be encouraged simply for the fact that roads could be utilizing for solar generation instead of converting open land to solar panel fields which destroys more of the Earth's pristine areas. Could not more electronic products have solar panels incorporated directly onto them? How many less mobile devices would be charged every day if every mobile device had a built in solar charger?

As of early 2016, 173 countries had renewable energy targets with solar and wind power being chosen by most as their main source to ultimately replace coal, natural gas, and oil. (395) In 2015, more than \$286,000,000,000 was spent on renewables versus \$130,000,000,000 that was spent on coal and gas fired power plants. More than 8,100,000 *Homo sapiens* worldwide were also employed by the clean energy industries, and in the United States the solar industry employs more than the oil and gas extraction industries combined. And while jobs in the clean energy sector grew by 6% in 2015, jobs in the oil sector shrunk by 18% over the same timeframe. (149) In 2005, there were 619 coal burning power stations, 1,664 natural gas burning power stations, and 781 renewable energy power stations in the United States. By 2015, the number of coal burning power stations fell to 427 while natural gas power stations increased slightly to 1,779 and renewable energy power stations grew rapidly to 3,043. (336) Even with this massive increase in the number of power stations the actual conversion process is tedious, as 84% of the total power currently generated in the United States is from coal, natural gas, or nuclear sources, in comparison with 100% clean energy sources like wind and solar only accounting for only 7%. (337) Worldwide it is estimated that only 2% of electricity is generated is from wind, solar, geothermal, biomass, and biofuels. (398) As a result of the energy sector still being dominated by fossil fuel companies, which have influenced government energy policies, an unnecessary redundancy of energy sources is being created in California. California produced so much solar power in March 2017, that it paid Arizona to take excess electricity its residents weren't using, and ultimately the state ordered solar plants to reduce production while fossil fuel energy plants continued generating electricity. (394) What good is clean solar energy if those in charge choose dirty fossil fuel when solar and wind are available in excess? Should there not be legislation which requires power companies to choose clean energy when it is available instead of choosing dirty fossil fuels?

Another solution is to incorporate more nature within cities and even buildings themselves, instead of having wasted spaces in the form of open areas on rooftops and vacant lots. In 2017, China announced plans for Liuzhou Forest City, a 342-acre city which can support 30,000 people with 70 buildings comprising homes, hospitals, hotels, schools and offices nestled within 40,000 trees and nearly 1,000,000 other plants. (390) A similar vertical forest containing some 900 trees in Bosco Verticale in Milan, Italy was inaugurated in 2014. *Homo sapiens* could also make their own individual flora ecosystems on the areas of Earth they inhabit in the cities, this will help in many ways like providing fresh vegetables, help to clean the air, and provide a habitat for faunae.

If *Homo sapiens* stop polluting the Earth with toxic chemicals, and instead use more natural biodegradable products utilizing the simple chemicals of nature, this will allow for a much smaller footprint. There are many innovations being done by scientists and companies around the world which employ natural materials and

methods to create an eco-friendly product. MycoWorks has created a fungus derived leather using mycelium which feels and performs like traditional leathers, while also being 100% animal free, plastic free, natural, and bio-degradable. MycoWorks has also designed furniture using mycelium, and other companies like Ecovative Design sell acoustic wall tiles, shipping containers, flowerpots, tables, insulation, mycofoam tiles, lighting, and portable ice chests made from mycelium as well. Using pineapple leaf fiber, the company Ananas Anam has created a textile called Piñatex, which can be used to manufacture footwear, fashion accessories, and furnishing. As the pineapple leaves are a byproduct of the pineapple agricultural industry this textile would be produced using no additional land, water, fertilizers, or pesticides. Studio Nienke Hoogvliet innovatively showed the potential of seaweed by creating a seaweed yarn and also using it to develop a natural dye in addition to using it to make a paint while also recycling the waste product into bio-plastic bowls. The German company ecoXpac has created the Green Fiber Bottle which is constructed from organic fibers and is 100% biodegradable. In 2017, researchers reported they had developed a two-step process involving the partial removal of lignin and hemicellulose from natural wood which gave it a specific strength higher than that of most structural metals and alloys. (695) Other innovations being explored to help clean Earth like the work being done at the company Kiverdi which has developed a technology to recycle carbon dioxide by utilizing natural microbes to transform the carbon dioxide and other gases into bio-based eco-friendly food and consumer products. Trees can also be sustainably grown and harvested in a responsible eco-friendly manner and the all-natural biodegradable wood can be used in helping to replace many current products which are now made of synthetic plastics containing toxic unnatural chemicals. This in addition to other plants like hemp, cotton, bamboo, linen, sisal, etc. which can be used in a variety of textile or other fiber related products or applications, and some plant oils can even be used to make a type of biodegradable packaging material to replace toxic plastics.

Solar thermal collectors can be used to harness even more of the Sun's abundant and endless energy to generate hot water, provide heating for buildings, prepare meals with a solar cooker, and generate electricity. Waste heat generated by everything from automobiles to commercial buildings could also be recycled and put to use. Cogeneration could be practiced by more companies large and small, this would help tremendously, and all the wasted energy produced would be put to use instead. Other alternative techniques for better energy management and conservation like passive solar, better insulated structures, and more energy efficient electronics and appliances could also help to drastically reduce energy use. How much power could be generated if all exercise equipment at gyms and individual homes had a generator to produce power and thus feed it back into the power grid? What about capturing energy from other anthropogenic activities that produce it, from walking to automobiles?

Environmental Legislation

How is it that society can so easily outlaw and for the most part prevent some harmful things which affect its citizens, and yet there is no worldwide consensus on truly outlawing the destruction of Earth or strictly enforcing environmental laws? It seems that the destruction must be catastrophic for anyone to take notice, and even then, too often there are not severe enough consequences for the commercial companies doing the destruction, and most just still continue doing business as usual. Many environmental disasters result in some fines, a cleanup effort and much of this is often done by individual volunteers and not by the commercial company responsible, a payoff to some of those affected, and a public relations campaign to smooth things over. Too often, decisions regarding environmental issues are left for the consumer to choose, when they should be enforced at the corporate level with legislation based on scientific evidence and logical thought. (e.g. most consumers decide whether or not to recycle their trash, why not enact more legislation which requires that all product packaging be from a flora-based source thus making it bio-degradable and recyclable so that either way if it was recycled or not the product packaging would never pollute Earth) What good are environmental laws if they do not protect the entire environment. (e.g. a law which bans the practice of whaling will save the whale from directly being killed by *Homo sapiens* hunting activities, but the whale could still be killed by pollution which has been allowed to contaminate the oceans) Instead of making the pollution problems manageable with laws, why not solve the problem and eliminate 100% of the pollution at the source with legislation, which not only stops the corporations from doing these destructive acts, but also holds those responsible for the destruction when and if it does occur?

There is an attitude by some, especially in the United States, that all environmental legislation, pollution controls, and other related regulations should be rolled back in order to somehow help promote businesses and generate more jobs, that jobs are more important than the environment, that the environment must be destroyed for progress, and that it is worth sacrificing the environment to make money in order to live. But these erroneous notions do not consider that if the environment is destroyed there will be no businesses left, no jobs, no money, and no one to work. The new clean energy and eco related business sectors have and will continue to create new and better jobs, like the innovative economy of the past has always done. Some forecasted that technology and the Internet would spell certain disaster for many jobs, but both have in fact created and continue to create vast amounts of jobs. Think how around 30 years ago there was no internet, no internet related companies, no smartphone, no apps, and now these business sectors generate trillions of dollars every year for the global economy, and these new technologies also created millions of jobs which previously never existed. Environmental legislation does not hinder economic growth, they protect the environment so there is a place for *Homo sapiens* and an economy to even exist in the future, by preventing greedy corporations and individuals from destroying the Earth for the almighty dollar.

In 1997 there were about 60 laws enacted to help curb global warming, since then, nations around the world have adopted more than 1,200 laws in a political effort to help stop global warming. (345) In most civilized nations there are some sort of environmental laws to help regulate air quality, water quality, waste management, sewage treatment, environmental clean-up, water treatment, chemical safety, mining activities, nature and wildlife protection, and other environmental issues. These laws have helped to reduce the impact of anthropogenic activities, and without them the world would certainly be bleaker with far less life and far more pollution. But it still seems that no environmental law is strong enough to truly protect Earth, they are either bypassed, broken, rewritten, not enforced, or simply not strict enough. There has been much progress with things like the Paris Agreement or the 169 targets set forth in the Sustainable Development Goals, but if these and other environmental and social resolutions are non-binding or have not been ratified, what is the point? If United Nation members agree then why don't they make it a binding resolution and ratify them immediately?

In the United States, there has almost always been political grid lock on environmental legislation, and progress has taken far longer in recent decades, unlike the early conservation efforts by some like President Theodore Roosevelt who alone helped to protect 230,000,000 acres of public land. There has been a history of environmental laws and bills being enacted by one president to only be reversed or simply not renewed by the next president. (e.g. President Carter's positive environmental efforts were partially derailed by the Regan administration, President Clinton's positive environmental efforts were partially sabotaged by the Bush administration, and President Obama's positive environmental efforts are now being partially dismantled by the Trump administration) There has also been some talk about environmental issues during the election campaigns, but then when candidates get elected there is very little action taken by most. The environmental issues will be solved far more rapidly if everyone involved becomes apolitical towards environmental legislation and begins understanding and recognizing the scientific facts, instead of allowing corporations, money, and greed to negatively influence the situation. What would the world be like if more *Homo sapiens* engaged in a type of deep ecology philosophy and a political ideology of Green politics or ecopolitics? Will the current environmental issues result in a rapid political shift in the near future towards Green politics or ecopolitics? Al Gore described the political stagnation in writing,

"President Bush reversed a campaign pledge to regulate CO₂ emission-a pledge that had helped persuade many voters that he was a genuinely concerned about matters relating to the environment.

Soon after the election, it became clear that the Bush-Cheney administration was determined to block any policies designed to help limit global-warming pollution. They launched an all-out effort to roll back, weaken, and-whenever possible-completely eliminate existing laws and regulations. Indeed, they even abandoned Bush's per-election rhetoric about global warming, announcing that in the president's opinion, global warming wasn't a problem at all."

"In my view, however, our system is on the verge of losing its essential equilibrium. The problem is not so much one of policy failures: much more worrisome are the failures of candor, evasions of responsibility, and timidity of vision that characterize too many of us in government. More than anything else, my study of the environment has led me to realize the extent to which our current public discourse is focus on the shortest of short-term values an encourages the American people to join us

politicians in avoiding the most important issues and postponing the really difficult choices.”

“Too often, politics and politicians have not served us well on environmental issues, but there is also a fundamental problem with the political system itself. Aside from its uninspired response to the environmental crisis, our political system itself has now been exploited, manhandled, and abused to the point that we are no longer making consistently intelligent choices about our course as a nation.”

“Too many people now feel that they have no way to exercise any real influence over the important decisions by government that affect their lives, that large campaign contributors have access to the decision-makers but the average citizen does not, that powerful special interests control the outcomes but a mere voter does not, that self-interested individuals and groups who can benefit from the decisions find a way to hot-wire the process while the broader public interest is ignored.

When the lack of accountability is due to corruption, the damage to democracy is especially severe. And in many countries, corruption is one of the principal causes of environmental destruction.”

“Indeed, in almost every case of environmental devastation, corruption has played a significant role in deadening the ability of the political system to respond to the early signals of degradation brought to its attention.” (38)

The Obama administration attempted to make more progress on the environmental front than any president has since President Nixon created the Environmental Protection Agency and helped to enact the Endangered Species Act of 1973. But the Obama administration was often blocked by the oil, coal, gas, and utility companies refusal to change and their use of lobbyist to exercise unethical control over the U.S. Senate, Congress, and other government agencies. Even with this barrier the Obama administration made many progressive steps in the right direction, but there are still some current government policies which encourage the destruction of the environment all in the name of economic progress. Globally there also appears to be much stagnation on many issues, and even with the Earth Summit in 1992, Rio+20 Summit in 2012, Paris Agreement of 2017, along with other positive conventions and protocols established, there still seems to be no real large-scale effort to rapidly confront the environmental issues on a global scale. What good are conventions, protocols, and laws if they are nonbinding and nations choose whether or not to enforce them? What is the use in trying to curb emissions when countries can use a cap-and-trade system to simply buy pollution credits? What good is a Kyoto Protocol that was adopted in 1997 not enforced until 2005, and not ratified by all countries including the United States, one of the largest emitters of carbon dioxide? Why are there acceptable levels of pollution? Shouldn't any amount of pollution be unacceptable and illegal?

Environmental legislation is excellent in principle, but it is useless if there is little to no enforcement, as is currently the situation in many areas of the world with too few police officers or other government officials which actually enforce environmental related laws. Most local law enforcement has not been educated about environmental crimes and how to recognize these crimes, nor are they ever told to make them a priority. In addition, many environmental laws which are currently used to prosecute the offenders which commit these crimes against nature, are very limited and do not impose very large fines, lengthy jail sentences, or even much community service. Environmental laws, over the last 50 years and more in recent times, have been enacted at the national level and affect an entire country, while others have been at the state or local city level. In the United States, there have been many monumental laws enacted to help protect the environment, like the Lacey Act of 1900, 1955 Air Pollution Control Act, Federal Water Pollution Control Act Amendments of 1972, The Endangered Species Preservation Act of 1966, Endangered Species Act of 1969, Endangered Species Act of 1973, and several others. With all these environmental laws, some of them very old, why is there still so much pollution and environmental destruction currently occurring? Are the laws simply outdated and not strict enough, or are they not being rigorously enforced? What good is a law if it is not obeyed by businesses and citizens alike, nor is it strictly enforced by law enforcement officials? How much small scale environmental damage goes on daily around the world by individuals who rarely if ever are caught or punished severely? (e.g. citizens which litter, or the millions of *Homo sapiens* throughout the world that pour oil and other toxic chemicals into the water or soil directly) Would not stricter and more heavily enforced environmental laws be beneficial for all inhabitants of Earth? Shouldn't the laws be stricter, and if anyone's actions have a negative impact on Earth directly, be it on public or private property, it is illegal? Punish the offender with cleaning up not only the mess they caused, but give them rehabilitation and education about their crimes, and help them to learn about nature, and what they are destroying, and how fragile and important the Earth is. If a law is enacted to protect a species

because it has been classified as endangered, but the government and conservation groups do not address the issues causing the destruction of that species, what is the point?

The issue which is hindering conservation resources and efforts may be more political than anything else. There were 108 extinctions in the United States during the first 21 years after the 1973 Endangered Species Act was enacted, and some of these species that went extinct were on the endangered species list or in the process of being listed. A 2004 paper on extinction and the Endangered Species Act found that,

"One hundred eight U.S. species are known to have become extinct in the first 21 years following the creation of the Endangered Species Act. We analyzed the conservation histories of these species and found that 23 species became extinct after they were placed on the endangered species list, but the majority of extinctions (85) involved species that were not on the endangered species list.

There were lengthy delays in the listing process for 83 (77%) of the species that became extinct: 29 of these species became extinct before a listing process was initiated, 42 became extinct during a delay in the listing process, and eleven listed species became extinct after a delay in the listing decision.

The use of the candidate list as a tool to defer listings for many years was particularly dangerous: 24 species became extinct after being placed on the candidate or warrant-review list. Listing petitions were routinely ignored to the detriment of the species: 17 species became extinct while their listing petition was under a long-delayed review.

If extinction is the ultimate criteria by which to judge agency implementation of the ESA, the failure has been spectacular. In many cases it has been purposeful. The agency has knowingly delayed listings to avoid political controversy even when it knew the likely result would be the extinction of the species." (522)

Some say that contamination will inevitably happen, that it is impossible to prevent all accidents and that some spillage will just occur as a result of using the toxic pollutants. (e.g. oil leaking out of cars on the roadway which then runs off via rainwater into the water and soil) This is an unacceptable excuse, as there are permanent solutions through utilizing less toxic all-natural chemical substances which are more biodegradable, by building more eco-friendly products which do not pollute the environment, and with the enactment of rigorous environmental legislation which is strictly enforced. If all-natural bio-degradable chemicals were used instead of toxic synthetic chemicals there would be less impact on the environment when and if an incident occurred. There are fortunately contingency plans setup by governments and commercial companies that are available in the event of a toxic spill. But unfortunately, no cleanup of toxic chemicals is ever 100% cleaned and quickly restored back to the way it was before the contamination. The only way to fully protect Earth is by eliminating the use of the toxic chemicals entirely, thus preventing the contamination from ever happening in the first place. Why is an oil spill or other environmental cleanup effort usually organized and done mostly by volunteers for free or by the government using tax dollars and not done fully by the company responsible for the toxic mess?

Grassroots Efforts

Future conservation will depend heavily consumer products becoming eco-friendlier, a change which can only be done at the manufacturing level, and while environmental laws will help to ensure this if commercial companies choose not to, more rapid change can also be initiated through consumer demand for more natural eco-friendly products or by consumers making more in-house products. Otherwise most commercial companies will choose the direction of easy profits, no matter the environmental damage, and the destructive cycle will never end. Another grassroots effort could be initiated at the consumer level which would involve things like organic gardening and creating foods and other products in-house with bulk organic ingredients using the Internet to find recipes and ingredients. And even the types of products being purchased can have vast influence not only on demand, but also through creating less consumption as more natural products are more durable and longer lasting. Further conservation efforts could be initiated within local communities by setting up groups and local trade networks, with each group member making a few bulk organic items and providing them to all the other group member based on a sort of '*sharing is caring*' principle.

It is often said that you cannot force *Homo sapiens* to do anything, and yet there are so many which are already subliminally being forced to do destructive things by outside influences, be it entertainment, businesses, the

government, religions, or another influential source. So, one might then ask why can't the influences be positive and for the benefit of all *Homo sapiens* and the entire Earth, instead of the current negative destructive paths which are being followed? This is perhaps where money and power play a vital role in what actually makes the world go around so to speak, and why positive change is usually a grassroots effort initiated by the few, but with the potential to be a majority. Grassroots movements at the local level are helping to change things in a very positive way, it seems that more *Homo sapiens* are making private parks and natural wildlife sanctuaries than the government in recent times, most likely due to red tape at the government level, budget constraints, political agendas, and not to mention public backlash of '*the government is taking more land*'. It also appears that the private or non-profit conservation areas of land are far better managed and far less encroached upon than the federal lands which allow a host of damaging activities to the ecosystem like: mining, hunting, logging, invasive fauna species are allowed to graze on native and sometimes endemic flora, *Homo sapiens* are allowed to collect some flora and geology specimens, geocaching, and other impactful anthropogenic activities.

Although the government may have enacted conservation laws over the last 100 years to protect nature, and this has helped and continues to help conserve much nature, it must not be forgotten that much of the original conservation efforts were initiated at a grassroots level mainly by individuals like John Muir, Bob Marshall, Aldo Leopold, Rachel Carson, Jacques Cousteau, and others, and not by the government or the politicians from within. The history of civilization is filled with humble individuals who have had more influence in changing the world positively than most presidents or the governments they lead. Throughout history there have always been individuals, usually eccentric, who have stood up for what is right and fought for equality on Earth for all species, it is unfortunate that more do not share this sentiment. The amount of solidarity displayed by followers of sporting events, religious gatherings, concerts, tributes, or other mass gathering is incredible. Why do *Homo sapiens* not display this type of solidarity more when it comes to environmental and social issues? What could be accomplished if the world displayed such solidarity when it came to recycling, picking up garbage, ending world hunger, or other issues? If things like the massive beach cleanup and tree plantings can be done by large groups of volunteers, and these things positive changes can happen in just one day, how long would it take to clean the Earth and replant trees if everyone took part?

Simple Individual Changes

Further environmental legislation will most likely continue to be enacted in the future, and new technology will also continue to be developed which will help in solving some issues, but other issues must be changed at the individual level. Each individual determines what the mainstream will be, change the mainstream and things will be ok. Too many *Homo sapiens* seem to be obsessed with greed, power, indulgence, laziness, and narcissism with no regard on how their actions affect Earth or other *Homo sapiens*, and if this changes it will benefit all of Earth in the end. There are some *Homo sapiens* that act as if they are drones doing exactly what they are told not ever caring, or even giving the slightest thought about the consequences of their actions. Some choose not to see the devastation that has happened on Earth, and they willingly choosing not to recognize the reality of *Homo sapiens* actions, while some others see the devastation and do nothing, perhaps it is because being a part of the problem is easier than being part of the solution. Some *Homo sapiens* just do not care about conserving Earth, there are many excuses, but none can mask the reality of their greed, power, indulgence, laziness, and narcissism. There is still much that needs to be done, and if *Homo sapiens* want to truly preserve Earth, it's all or nothing, because all the florae and faunae and every living organism of Earth are connected and related. Some *Homo sapiens* ask questions like, will I be part of the problem or the solution? How will you go down in history? How sincere about conservation and coexisting with Earth are you? What have you done to deplete Earth in your lifetime? What have you done to help towards the conservation of Earth during your lifetime? Martin Luther King Jr. wrote,

"One of the great liabilities of history is that all too many people fail to remain awake through great periods of social change. Every society has its protectors of the status quo and its fraternities of the indifferent who are notorious for sleeping through revolutions. But today our very survival depends on our ability to stay awake, to adjust to new ideas, to remain vigilant and to face the challenge of change. The large house in which we live demands that we transform this worldwide neighborhood into a worldwide brotherhood. Together we must learn to live as brothers or together we will be forced to perish as fools.

We must work passionately and indefatigably to bridge the gulf between our scientific progress and our moral progress. One of the great problems of mankind is that we suffer from a poverty of the spirit which stand in glaring contract to our scientific and technological abundance. The richer we have become materially, the poorer we have become morally and spiritually.

Every man lives in two realms, the internal and the external. The internal is that realm of spiritual ends expressed in art, literature, morals and religion. The external is that complex of devices, techniques, mechanisms and instrumentalities by means of which we live. Our problem today is that we have allowed the internal to become lost in the external. We have allowed the means by which we live to outdistance the ends for which we live. So much of modern life can be summarized in the suggestive phrase of Thoreau: "Improved means to and unimproved end." This is the serious predicament, the deep and haunting problem, confronting modern man. Enlarged material powers spell enlarged peril if there is not proportionate growth of the soul. When the external of man's nature subjugates the internal, dark storm clouds begin to form." (508)

A very disproportionate amount of *Homo sapiens* actually get involved to make any sort of positive changes for Earth when compared with those which do absolutely nothing, and even fewer get directly involved to help. Every individual lifestyle choice and change can have an impact on Earth and help to reduce consumption, but you must make conscious decisions, and positive choices for Earth. If all individual *Homo sapiens* examine their ingrained habits, lifestyle, and choices contemplating how much consumption they are engaged in, they will perhaps then see how much of an unnecessary footprint they are making on Earth. There are many paths in life and many turns along the way which lead down other paths, some positive and others negative, and choice usually plays a part in which path is followed during the journey of life. Does one choose the natural products when available or synthetic plastic? Does one choose to purchase individual plastic water bottles consuming several per day or does one utilize a more natural, durable, and longer-lasting metal container refilling it from a potable water source? Does one choose to utilize biodegradable wooden toothpicks or plastic ones? Does one choose to buy cotton clothes or other natural fabric, or synthetic plastic? Does one eat the entire fruit or vegetable, or discard perfectly edible skins, stalks, or other parts? Does one use things like a bath towel only one time before washing it? Does one choose to purchase and own redundant things for no reason, like 30 bath towels when only 5 are really needed? Does one need to own 10 or more pairs of shoes? Does one have such a surplus of food that it goes rotten before it can be consumed? Does one have a canvas bag to carry goods in versus relying on and choosing a plastic bag? Does one choose to recycle products and their packaging? Does one choose to turn the water off while brushing their teeth, or leave it running wasting water? Does one utilize things until they have no more use? Does one invest in a small solar panel to charge their phone, or use a traditional energy source?

Everyone lives in their own little inner world, but the bigger outer world is a part of it, and what goes on in everyone's little inner world affects the bigger outer world as a whole. It is about the lifestyle one lives and the impact their lifestyle choices have on society, and more importantly on the natural environment of Earth. Simple individual lifestyle changes which benefit the entire planet, and are what will perhaps truly save Earth in the end. Individual grassroots conservation efforts can be done by going back to the natural way of doing things and making positive choices based on logic. Simple things can have major positive impacts like: Washing the dishes by hand a couple of times a week, versus using a convenient power consuming dishwasher. Washing clothes in cold water instead of hot water. Instead of using a dryer, hang wet laundry on a line and utilize the Sun and wind. Use a rake instead of a blower to gather lawn debris. Using food waste as compost to fertilize the lawn, an edible garden, or another area of Earth in the city, and help to reduce landfill waste while also helping to rejuvenate the soil. Take one less shower per week to save energy and water. If something is made of plastic, don't buy it unless absolutely necessary, find the natural alternative, in most instances there will be a natural alternative. Support local farmers markets. Buying Green Bonds and invest money directly in companies that are known to be environmentally friendly. Bring your own metal washable silverware for meals instead of using plastic disposable silverware. When boiling water to cook foods like pasta, potatoes, or other vegetables instead of using a full pot of water, conserve water and use the minimal amount of water needed. Plant an indoor or outdoor organic fruit and vegetable garden, or start or join a community garden or agrihood. If more *Homo sapiens* go back to some form of gardening, indoor or outdoor on either an individual or community level, this will help to improve diet and health while helping the environment in many ways. When altering the land around a dwelling don't kill flora, transplant it, and try to incorporate native florae to restore the original ecosystem. Recycle. Pick up trash when you see it, don't just walk by and ignore it, how much cleaner would Earth be if everyone picked up one piece of trash a day? Recycle things you don't use by donating them to a less fortunate

individual who can use them, through Craigslist Free section, social media, or to a thrift store. Done reading a book, don't put it on a shelf and eliminate the knowledge from circulation, pass it on to someone else. Get involved directly and share your skills and talents by volunteering to help a positive cause, or simply mentor an individual. Get involved with politics by contacting your representatives in the Congress and Senate or by attending a local city council meeting. Seek out change and request it from your elected local, state, and federal government representatives, if they do not change, elect someone who will, but get involved and do not stand passively by doing nothing. Purchase products from environmentally friendly companies. Show you want change in your products from the ingredients to the packaging by contacting companies directly and requesting change. Instead of driving, carpool with a neighbor or ride the city bus once a week or more. Be friendlier towards others in the world, communicate with others by simply saying hello, buy a random stranger a meal or a cup of coffee regardless if they need it or not.

CHAPTER VII.

The Future

Recognition and Forethought

Three of the most difficult things for most *Homo sapiens* to acknowledge are, when they are wrong, when a mistake has been made, and when they do not know something, be it the answer or sometimes even the question in which to ask. How can one see the wrong in their actions if they refuse to look? How long will the world continue down the current negative path of self-destruction? What will happen when the vast majority of *Homo sapiens* on Earth get access to information and truth combined with a completely different set of ideals without the restraints of the tyrannical past? If those seeking out the logical scientific truth and answers to so many of their unanswered questions receive both, how will this change the world? *Homo sapiens* are not born with destructive lifestyles, they are born into them and learn from others as a child and then through adulthood. If so many *Homo sapiens* have learned the wrong way of doing things, then they certainly have the potential to change and learn to coexist on Earth through education and the realization of scientific facts. The conservation of Earth must be the first priority with every endeavor and action *Homo sapiens* attempt, otherwise there is the possibility of altering the habitability of Earth, and thus the endeavor or action being done will be pointless. The Constitution of the Iroquois Nations also states,

"In all of your deliberations in the Confederate Council, in your efforts at law making, in all your official acts, self interest shall be cast into oblivion. Cast not over your shoulder behind you the warnings of the nephews and nieces should they chide you for any error or wrong you may do, but return to the way of the Great Law which is just and right. Look and listen for the welfare of the whole people and have always in view not only the present but also the coming generations, even those whose faces are yet beneath the surface of the ground -- the unborn of the future Nation." (306)

Look around at Earth, the planet which you inhabit, see the destruction which surrounds you and is going on before your very eyes, see what perhaps you or your ancestors have done and what you perhaps continue to do on a daily basis or allow others to do. And for what money, control, a false sense of security, a temporary and brief happiness? And how many other *Homo sapiens* had to sacrifice their land, food, education, life, or something else for this? Many tourists drink more alcoholic drinks in one night while vacationing than some families in those countries being visited spend on food in a month. *Homo sapiens* have advanced rapidly in many ways but at what cost, to not only the environment of Earth, but to humanity itself? Was the destruction of Earth a necessary cost of civilization, or could it have progressed with more natural methods and materials that were based on coexisting with Earth? How would civilization be now if it had progressed more slowly and evenly over a longer time period, with better morals and without all the greed, corruption, and other things which still plague many societies even today? How much less polluted would Earth be if civilization would have initially been focused more on nature and coexisting with Earth? The world is a much better place than in the past for *Homo sapiens* as a species, but at what cost to the natural world around them?

One can witness everything done by *Homo sapiens* positive and negative learning from it all, but only if they choose to open their eyes. There are a few documentaries and news programs which cover some of the current and past social and environmental issues, and with most of the last 75 years of history having been recorded through video or audio, anyone looking for the truth could look at any of the factual documentary video and audio readily available online. Godfrey Reggio's 1983 film '*Koyaanisqatsi*' shows a good visual synopsis of the modern world and some of the anthropogenic impacts up until 1983. The Smithsonian Institution's 2017 program '*America in Color*' which covers the 1920s, 1930s, 1940s, 1950s, and 1960s is a good video history of early 20th century in America. Shaun Monson's 2015 documentary '*Unity*' details the struggle *Homo sapiens* have with coexisting with each other and other species. Most everyone in the civilized world knows of some environmental or social issue, of global warming, pollution, and perhaps some of the other depredations done by *Homo sapiens*, but many only know of it, they do not know the reality, facts, details, and severity of the issues. It

often seems that if someone wants to see the reality of *Homo sapiens* depredations they must seek out this suppressed information, which should be prevalent in education and news coverage. The environmental and social issues are now very well documented, but unknown to many *Homo sapiens*, and although the Internet and social media are beginning to change this, many are still unaware of the issues and the true history of society. If this changes and more become aware and concerned with the social and environmental issues, perhaps it will then simply be a matter of *Homo sapiens* throughout the world getting involved and working together to solve the issues.

If one truly thinks and believes they are correct and never chooses to engage in logical thought and recognize indubitable scientific facts, how will they ever believe the truth much less initiate some sort of positive change? Some *Homo sapiens* are simply ignorant of the facts and the reality of what is occurring in the world around them. They either ignore, disbelieve, or simply do not know of the suffering, injustices, and other negative things society does to itself. They live in an isolated world of seclusion, and one might even argue that they are better off than the individual who contemplates about the true reality of the world. Perhaps it is that these *Homo sapiens* have been lied to so much that they now themselves believe the lie, even though that deep down they know that they are being lied to and coned. Or perhaps these *Homo sapiens* just do not know the truth even though they are surrounded by it daily, as one can easily see the destruction everywhere if they simply open their eyes and look. The mentality of these *Homo sapiens* seems to be that they have no awareness of the issues, make no analysis of the issues, and just have reactionary opinions to the issues when, if ever, they are discussed. Some *Homo sapiens* appear to be addicted to their lifestyle choices and have a high degree of narcissism, and although the planet functions as a whole and most everything affects most everything else, there is no thought by most about the whole of humanity, much less that of a whole Earth. Their mentality is only self-centeredness instead of thinking about the Earth as a whole and how their negative actions can affect others, and how everything is connected, and everyone's actions truly matter. Why do so many in the world seem so reluctant to change the way things are even after it has been proven with scientific evidence that the environment of Earth is being destroyed? Al Gore wrote,

“It is already clear that our information about the global environment crisis does fall into a discernible pattern. For many, this pattern has become painfully obvious. But others, it is still invisible. Why? The answer, in my opinion, is fear: too often we don't let ourselves see a pattern because we are afraid of its implications. Indeed, sometimes the implications suggest dramatic changes in our way of life. And, of course, those who have the heaviest investment in the status quo—whether it is economic, political, intellectual, or emotional—often organize ferocious resistance to the new pattern regardless of the evidence.” (275)

How Bad Is It?

Is the situation bad? Yes, but it could be much worse. Think how far *Homo sapiens* have gone in just the last few hundred years, from tyrannical rulers and massive wars of conquest to working towards and nearly accomplishing worldwide democracy and peace. How much more polluted would the world be if all 7,300,000,000 consumed and polluted as many western lifestyles do? How much warmer would the planet be if all 7,300,000,000 *Homo sapiens* owned an oil powered automobile? There will most certainly be a lot of pollution and trash for future generations to clean-up, and they will most likely ask why and how their ancestors could have done such savage deeds and lived so morbidly while being so self-absorbed. When one thinks about all of the depredations done by *Homo sapiens*, it is easy to have a pessimistic attitude toward the issues, and then perhaps only ponder how much can Earth take before the tipping point is reached and there is no return. But focusing on negative doomsday and worst-case scenarios while losing all hope of anything getting any better is a negative perspective which can only spread further negativity and hinder positive change. If one is a pessimist and not an optimist they will most likely be very miserable, angry, sad, and usually delusional in their outlook on life. *Homo sapiens* have amazing qualities and each individual has the ability to change themselves and contribute to an overall positive worldwide change.

Some see the Earth as perfection that once was and will be never be again because of just a few recent generations of *Homo sapiens* causing these depredations to Earth. Although everyone has been deprived from seeing nature fully in a natural untouched and unaltered form, modern-day *Homo sapiens* are fortunate enough to

have been able to see what they have in their lifetime, future generations may not be so fortunate. Will there ever be a perfect natural Earth like before the industrial revolution or before civilization began 10,000 years ago? The answer to that question is No, impossible, the damage is already done, the species are already extinct the ecosystems already altered. But these ecosystems can recover, if left to heal on their own and not with Frankenstein science that will most likely do more harm than good. Can you protect what is remaining? Perhaps. For the first time in history, more than half the world's population lives in civilization, and this is a good thing for nature because so long as *Homo sapiens* stays in the cities for the most part, and out of the remote protected ecosystems they will perhaps sustain and remain in some form. This is also dependent on the fact that *Homo sapiens* can move to more renewable energy sources and more natural materials for products, along with a host of other positive changes for not only the environment but for society itself, which appear to already have been initiated.

A Rapidly Evolving Species

One could argue that many of the points raised in the 2006 movie '*Idiocracy*' by Mike Judge are very relevant, and even seems to mirror some aspects of society past and present. *Homo sapiens* have often portrayed *Homo neanderthalensis* as brutish and dumb, when in fact they were the exact opposite, and in fact some modern-day *Homo sapiens* would appear to better fit this description. Over the last 10,000 years *Homo sapiens* have rapidly evolved from a primitive hunter gatherer species to a technologically advanced species, and as time goes on *Homo sapiens* will most likely continue to evolve ever more rapidly, especially with further advancements in science and technology, and much of this evolution will perhaps be more mental rather than physical. Given that under the right factors, which are a combination of certain physical, but mostly mental experiences, one will evolve into the type of *Homo sapiens* that they are. Among other things these factors determine the outcome of a *Homo sapiens* actions and feelings towards the world around them throughout their lifetime. One could read a book or see a film at one point in their life and then view it again at another point during their lifetime, and the reaction they have to it based on the influence it has made on them could be completely opposite from one another, based in part on the factors previously described.

Over time the traits which define *Homo sapiens* have undergone a metamorphosis ultimately advancing into the best thing for the species as a whole while reducing and even eliminating negative social and environmental issues. (e.g. peace, freedom, democracy, equality, recycling, etc. have all taken root in many societies whereas these things were nearly nonexistent before) Take for instance something *Homo sapiens* did in the past and evolved away from like sacrificing other *Homo sapiens* to imaginary Gods. Over thousands of years this was evolved away from and replaced by other religions, which currently *Homo sapiens* are again evolving away from and turning to a religion based more on scientific and philosophical type views based on facts and new ideas, versus the traditional religions which are all based around faith and worship of what someone said was the word of God. One could look at many other cultural and social traits throughout history which *Homo sapiens* passed down from generation to generation, and at some point, either evolved away from completely or have transformed the trait into something presently used. Based on this, one might also be led to believe that given enough time *Homo sapiens* will eventually evolve out of other negative traits like greed, power, indulgence, laziness, and narcissism.

Some *Homo sapiens* are stubborn when it comes to change, and some will never evolve, but their ideas and thought processes if they are negative and wrong will eventually die with them as society continues to evolve around them, and their offspring will either evolve or suffer the same fate. As the world changes more and more rapidly, so do *Homo sapiens* with the offspring usually seeing the world slightly, if not entirely, different than their parents, and more especially their grandparents. Often, *Homo sapiens* offspring evolve so much so that they are nothing like their parents or grandparents at all, and this type of evolution is usually related to circumstances which heavily influences the offspring, and ultimately, they break the cycle of negativity and are nothing like the parents. (e.g. a parent is an abusive alcoholic and as a result of the child experiencing this they never drink)

Progress Being Made

If *Homo sapiens* utilize science and technology responsibly within a democratic system of government, and logic is the preferred method of thought, things could certainly continue improving and eventually stabilize creating a utopian future for all of humanity. As history has repeatedly shown, a society can only be suppressed and forced to do negative self-destructive things for so long. Eventually some members of society rises up and change things for the betterment of society as a whole, correcting the past mistakes of their ancestors. That is the beauty of democracy, in that, eventually truth and justice do prevail given enough time and efforts by those which initiate positive change. Take for instance, the recent American Civil War statues being removed throughout the United States. Some stubborn individuals, many of them closeted racists, oppose this type of change saying that it is altering history, that it is the fall of the American and that things should just be left alone. But when the history is clouded with negativity and hatred, it can only perpetuate it into the future. History has not been changed, only what is being honored, and when dead racists are honored for revolting against the United States, it is not a positive thing for society.

A dramatic new shift has occurred in the world and it began with the civil rights and counterculture movements of the 1950's 1960's and 1970's. This was the beginning of true democracy, justice, equality, and individual freedom, and the rate at which these principals have begun to take hold throughout the world are exponential. Overall *Homo sapiens* appear to be on a path towards a more positive future which includes liberty and equality for all citizens of Earth, no matter their sex, race, gender, sexual orientation, religious beliefs, physical capabilities, or other qualities. But there is much that still needs to be done with regard to achieving a more utopian society, one in which *Homo sapiens* not only coexist with each other, but with all other species as well, and to achieve this *Homo sapiens* must reconnect with nature. It isn't that hard to imagine a more utopian world of the future, a society based around the universal principle of coexistence, no more oppressive religions, freedom for all citizens of Earth, a democratic world government which represents all *Homo sapiens*, no focus on materialism, all natural and bio-degradable products, healthy nutritional foods, 100% renewable energy, etc. But what will it take to reach this utopian state? One can also look at the world optimistically and see that the situation from an outside perspective seems to be improving, and yes progress has been made throughout the world, but vigilance is necessary to permanently solve the global environmental and social issues. Many things need attention and resolution, some of which are covered in this book, and when these issues are resolved it will lead to positive social changes and a less polluted environment, ultimately helping to create a better Earth.

Over the last 50 years, many remarkable advancements have been made in many fields of science. But most impressive is the progress *Homo sapiens* have made towards more natural energy sources and environmental conservation, and as a result one can envision a potentially positive outcome in the future. *Homo sapiens* appear to be turning things around in part, but the destruction of Earth continues and there is still much work that needs to be done and many devastated ecosystems to clean up from past mistakes. Yes, things appear to be moving in the right direction renewable energy sources, electric automobiles, recycling, etc. but will it be too little too late? How many more species will die? How much more of Earth will be polluted? What will be the final impact of all the anthropogenic activities since the industrial revolution? Some *Homo sapiens* appear to be changing their habits and the world around them in a positive way and for the good of Earth, but progress still seems slow. With more and more *Homo sapiens* striving to make the world a better place, combined with science and technology, things will most likely continue moving towards a more positive direction. And the question remains as to how much is being fixed or saved, and how much is still being destroyed at the same time? If *Homo sapiens* A recycles one aluminum can while at the same time *Homo sapiens* B throws 10 aluminum cans into a landfill, one can clearly see the imbalance. Can and will all *Homo sapiens* make enough positive changes that are needed to make a difference during the small window of time which remains?

Homo sapiens have made much progress over the last 10,000 years, one could think of in the not too distant past how some negative things were much more prevalent and even socially accepted, like women suffrage, human slavery, racial discrimination, religious wars, the subjugation of indigenous *Homo sapiens*, etc. Some negative things have simply taken another form, like imperialism which is now done more economically with the colonization of countries being done through corporations and their brand names. There is much progress which has been made with more freedom and logical order in the world today than ever before, and this has helped to spread equality, justice, and to create worldwide social change and environmental conservation. If society

continues to move in the positive direction it is going, then the negative things will most likely become non-existent at some point in the very near future. Comparing past history with the present day, one could easily argue that humanity is far closer to utopia today than of any other past civilization, perhaps simply with technology alone. But the citizens and their lifestyles are what truly make a utopia, and in this aspect modern day *Homo sapiens* could perhaps mimic the lifestyles of their ancestors a little more closely. Humanity is far better off now than at any time in the past because of the progress of civilization, technology and science, but it has also resulted in major negative environmental consequences impacting every species on Earth including *Homo sapiens*. Technology and science can be a good thing, but only when used more responsibly, and with more forethought and coexistence in mind.

Eco-Generation

There can be a balance between nature and with that of society, a modern living style, and technology, but if *Homo sapiens* are to ever achieve this type of existence on Earth it will have to be by choice, and choosing to change is the beginning of this movement which appears to have already been initiated. There have always been *Homo sapiens* who have coexisted with Earth, and for millions of years it was the majority of *Homo sapiens* whom inhabited Earth, now this number is a very small. And although some of the baby boomers may at least practice some type of environmental conservation and attempt to coexist, these eco-friendly members of their generation are still a minority. The eco-generation born in the 1970s until present day are the ones mainly responsible for the mass effort of worldwide environmental conservation. Their parents and grandparents are members of the generations which are mostly responsible for severely polluting, depredating, and exploiting the Earth. The eco-generation will most likely be the ones to change things and save the Earth, as they are certainly on a different path, unlike the aging and dying baby boomers most of whom just sit back and ignore, deny, and refuse to believe the truth of what their actions have done and are doing to Earth. In Robert F. Kennedy's 'Day of Affirmation Address' given at the University of Cape Town, South Africa, on June 6, 1966, he said,

"...Our answer is the world's hope; it is to rely on youth. The cruelties and the obstacles of this swiftly changing planet will not yield to obsolete dogmas and outworn slogans. It cannot be moved by those who cling to a present which is already dying, who prefer the illusion of security to the excitement and danger which comes with even the most peaceful progress. This world demands the qualities of youth: not a time of life but a state of mind, a temper of the will, a quality of imagination, a predominance of courage over timidity, of the appetite for adventure over the life of ease – a man like the Chancellor of this University. It is a revolutionary world that we all live in; and thus, as I have said in Latin America and Asia and in Europe and in my own country, the United States, it is the young people who must take the lead. Thus you, and your young compatriots everywhere have had thrust upon you a greater burden of responsibility than any generation that has ever lived.

...It is from numberless diverse acts of courage such as these that the belief that human history is thus shaped. Each time a man stands up for an ideal, or acts to improve the lot of others, or strikes out against injustice, he sends forth a tiny ripple of hope, and crossing each other from a million different centers of energy and daring those ripples build a current which can sweep down the mightiest walls of oppression and resistance..." (673)

Perhaps the eco-generation with scientific and technological advancements will clean the Earth in a way never before thought possible. If future generations figure out the entire puzzle of life, could they ultimately fix almost everything that was done wrong to Earth and correct all the past depredations of their ancestors? If *Homo sapiens* move towards more natural lifestyles consuming less, and science continues advancing this could be possible. Perhaps scientist will find new ways to naturally clean Earth and rid it of the toxic waste which is accumulating. Or perhaps the simplest solution would be the most effective, stop destroying Earth, stop trying to fix everything, leave nature alone and allow it to fix itself. Perhaps this path of depredations is part of the evolutionary path of knowledge that *Homo sapiens* are meant to take, and it is only through this path, that future *Homo sapiens* will evolve to the next phase of exploring other planets in the universe without destroying them like Earth has been destroyed.

The eco-generation seems to be infuriated and disappointed with their predecessors and the Earth it is inheriting from them, but this is in fact initiating even more positive change and creating a youthquake. The old majority of *Homo sapiens* with the old school of thought is a dying breed, things are changing rapidly as the younger generations begin to inherit the power on Earth. And unlike their predecessors, they are far more educated, caring, open minded, nonconformist, less credulous, and non-religious especially in a traditional sense. But is

the world actually getting better, or is a new generation simply continuing the destructive practices while adding some new destructive elements as well? (e.g. a new generation does not hunt and decimate the wildlife with guns and fur trade, but yet it has more numbers going into wilderness and playing weekend warrior destroying the wildlife with the trash it brings in)

The baby boomer generation and the remnants of their even worse predecessors which currently still heavily dominate and influence many aspects of the world will be no more in 25 years they will all be dead or dying. In 2015 there were 1,800,000,000 *Homo sapiens* between the ages of 10 and 24. (413) Once the eco-generation takes over completely in time, and the old are no more, the Earth will be a far different place and most likely for the good. Anyone who looks at most persons born since 1970 can see a vast difference between them and their parents, and even more especially with their grandparents, mainly due to the technology, education, and other opportunities available to them. The failed ideologies of isolationism, extremism, racism, nationalism, hate, and other negative elements of society are becoming less prevalent as most citizens in the democratic and free world continue to express a desire for universalism, equality, freedom, open-mindedness, love, a clean environment, and other positive social qualities. The demagogues and their fearmongering tactics with their racism and isolationism are becoming the minority and are slowly being replaced with the globalization of business, society, and ideas, and ultimately a world which accepts all positive and peaceful things. And when this current minority of society, the generation born before 1970, which has fostered these negative ideologies is no longer in control, this negativity which has hindered the world for so long will be no more. And no matter the stubbornness of the few, the entire world is ultimately moving towards renewable energy, electric automobiles, recycling, and other positive environmental and social changes. The eco-generation is becoming educated in the disciplines of science, technology, and history, and they are seeking out the facts and finding the truth while adding pieces to the puzzle called the mystery of life. One can see vast differences if they observe the actions, thoughts, ideas, lifestyle, and even demeanor of the eco-generation, which are logical scientifically minded individuals who make up the majority now, versus the dying minority of illogical fanatical religious followers.

As time continues to ever pass one can look at history and have a cynical perspective when seeing the facts of *Homo sapiens* depredations or have an optimistic perspective and see the facts of how much *Homo sapiens* have accomplished thus far and the efforts of those attempting to correct the negative elements. There are millions of *Homo sapiens* which are dedicated to humanitarian and environmental causes around the world, and they follow in the footsteps of the millions of other selfless *Homo sapiens* who have visited this Earth and done the same before them. These are individuals who are attempting to make a difference in the world around them no matter the odds that they face, which are most definitely against them and the movement itself. One could be led to believe that things are changing for the better in many respects and that the evidence can be seen in the changes not only at government levels but at the commercial and private level as well. More most certainly needs to be done but at least the change has begun now rather than later.

Globalization and World Government

Globalization is sometimes regarded as a negative thing which must be avoided, but in reality, it is inevitable, and it can be a good thing, if all cultures are allowed to flourish freely and equally on a world stage. Some oppose globalization, but what they fail to realize, be it an American or a member of an indigenous tribe in some remote region of the world, is that globalization is not about the destruction of cultures and governments, it is the exact opposite in that it will ultimately unite all cultures and governments. Cultures will not disappear or be erased through globalization, they will in fact evolve and flourish on a global scale. The only way cultures disappear is when the culture itself evolves into something else over time, as all cultures eventually do given time, or a forced assimilation is done through barbaric means, as was the case during the Age of Discovery by the conquistadors and as many other empires of the past have also done. When the Romans, Greeks, Mayan, Egyptians, and so many other civilizations fell, were these cultures erased and forgotten? No, they evolved into what are now the present-day cultures which inhabit these areas. Throughout history much of civilization has been about cultures changing by merging and working together while respecting each other's differences and finding commonalities. Anti-globalization is really nothing more than a form of xenophobia and racism by those who live in the past and refuse to evolve. Nations have existed since civilization began, but in the future perhaps

one world government with a consensus of ideas from around the world will be established. But how can the world unite when a handful of nations with economic and military superiority form exclusive groups like the G20 or NATO? Will *Homo sapiens* eventually eliminate the nationalism, pride, and petty competition which exists between so many nations and become one world? Why can't the world be based more on the governance model of Antarctica, a neutral territory governed by international treaty which forbids military activity and promotes scientific educational research? If this can be done for one continent, why can't it be done for the entire planet?

Homo sapiens most likely started out somewhere in Africa, and eventually emigrating to all corners of the world creating unique varieties of itself, each with a defining knowledge, culture, language, government, lifestyle, etc. And now with globalization all *Homo sapiens* are merging back into one united species again blending all of it together. As the world moves more towards a world government type system, with nations working together, things appear to be changing for the good. Countries can influence one another and show how success has been achieved in one field or another where another country may be failing. Internationalization is happening more rapidly and even more especially now that the world connects with itself like never before through technology. Smaller local communities are becoming major influences worldwide for other communities and even individual *Homo sapiens* to follow their proven example lifestyles. They are sharing their native traditions, customs, simpler natural lifestyles, alternative perspectives on the world around them, and unique products which help to fuel a growing natural based global economy. Ina Corrine Brown wrote,

“Understanding the ways of other peoples is important also because such understanding increases our own self-knowledge and objectivity. We grow up with the assumption that our own way of doing things is the right way, if not the only way. Yet we are aware of many problems for which we do not know the solutions. A knowledge of the variety of ways in which other peoples have met similar problems gives us new perspectives and new clues to human behavior.” (21)

Homo sapiens now have a continuously growing Internet which has created a global communication and educational system available to all *Homo sapiens* worldwide. And as *Homo sapiens* begin to move towards globalization with a world government, and nationalism and xenophobia become things of the past, *Homo sapiens* will become even more united as a species, and everyone can teach and learn with each other. This merging of governments, companies, and societies with their cultures, lifestyles, and ideas from around the world, will help to change the world in many aspects, ultimately with the best and most beneficial ideas gaining popularity. A world government would mean that peace, freedom, security, equality, justice, human rights, and other positive aspects of life would be guaranteed to all *Homo sapiens* which inhabit Earth. A world government would also mean a global military, and as there would only be one military this could prevent unwarranted attacks of nations with a large military, like the 2003 invasion of Iraq which was based on falsified evidence, there would also be an end to ongoing religious wars like the 70-year Israeli–Palestinian conflict. It could also eliminate things like economic espionage. Territories which are non-self-governing or are under some form of control like Guam, Puerto Rico, Falkland Islands, French Polynesia, Tokelau, and others would no longer be in nationality limbo, and would be free from the control of the United States, United Kingdom, France, and New Zealand and would part of a world government. There would be fair trade throughout the world and no more exploitation of 3rd world countries by world superpowers.

Future Education and Access to Information

With education anyone is capable of change and improvement, but often times one must want the knowledge and seek it out. Education is a very important part of conservation efforts, but this education may be hindered as many get their knowledge from unreliable entertainment related sources, rather than reading books or papers written by scientist who are experts. Education about nature in a school is often severely distorted with pseudo information and based entirely around an old school of thought and method of education. Students are not taught to experience nature through the self-discovery and self interpretation method, but rather this is the system and how it works. Originally education about nature was taught by parents when *Homo sapiens* were more connected with nature and the Earth, but this is very rare today. This past education style taught more respect for nature and was based on thousands of years of passed down knowledge gained from a connection and interaction with nature. When *Homo sapiens* loose a connection with something, or never had it in the beginning, they often do

not care or wonder about it, and when they do come into contact with it regularly in a genuine way and are not reliant on it in any direct way they usually have no respect for it and many times deprecate it. Now like much knowledge on Earth one must seek it out and then decipher what is true, false, current, out of date, relevant, and irrelevant.

Some forecasted that printed media and more especially books would be replaced by technology and that this would somehow lead to history being forgotten. But the exact opposite happened, as this bleak forecast did not consider that the Internet would contain more of all of the typography media ever created than any library ever could, and that it would be accessible to everyone with an Internet connection. Before most were limited to the local library, but now thanks to Project Gutenberg, Internet Archive, Google Books, Universal Library, Library of Congress, and other digital libraries millions of books in various languages are now easily accessible to anyone worldwide with Internet access. There are vast resources available to anyone for free by experts in any field through blogs, scientific papers, and university websites. Wikipedia has become the largest encyclopedia of information in the world with thousands of teachers, scientists, and other experts contributing accurate information. It is now simply a matter of choice as to what one exposes themselves to, and what one chooses to study if anything at all.

Others in the past forecasted doom, in that there would be too much information, and thought that it should be limited. But this sounds all too familiar to limiting freedom of information, and too much like a repressive government or some other form of information control. The more information the better, let the individual have the choice and the ability to determine if the information is relevant or irrelevant, true or false. The epistemology of the past has been transformed dramatically with the Internet as it has far more sources and social platforms in which information is transmitted instantaneously around the globe. Some *Homo sapiens* spread a negative message of fear targeting society's phobias by using false information and worst-case scenarios. And while the Internet has helped to proliferate this negative information spreading, when society does get accurate relevant information from reliable sources, far more positive change usually is initiated. This is all part of the learning experience and as history has shown, false irrelevant information usually has a way of fading away over time while the truth and relevance prevail.

If anything, the Internet has and will continue to help organize information allowing for easier faster access to it, thus allowing all *Homo sapiens* to expand their knowledge by simply having access to it. It allows the individual to choose between what Neil Postman referred to as, "...knowing *of* lots of things or knowing *about* lots of things." (47) The Internet has opened the door to many things which were once controlled by corporations, bringing new and different sources of information and content. (e.g. there was not one single vegan cooking show on television, now there are dozens via video streaming services like YouTube, or in the fact that there were once only newspaper and television news sources which were controlled by several corporations, now the internet has allowed many more sources of news to emerge) With the Internet, every citizen of Earth now has a voice and the potential to be heard worldwide. Could the Internet possibly be the true salvation for *Homo sapiens* and Earth providing truth, awareness, dialogue, and change to all citizens?

The Internet has also initiated further positivity with things that are community based, and focused more on education and access to information, and not on money and profits. (e.g. Wikimedia, Archive.org, Open Library, Project Gutenberg, Google Books, Khan Academy, Opensource software, Creative commons licensed materials, public domain data, etc.) This community-based system of freely available information and technology has helped to initiate positive change not only on the Internet, but within the real world itself. The Internet is allowing individuals who do truly care about humanity to share ideas, thoughts, resources, and more with a world which needs more positive education, inspiration, and influence. Free education and knowledge is now available to *Homo sapiens* now like never before, and the knowledge continues to spread ever more rapidly now, than at any point during the history of civilization. There is now an opinion and truth revolution with more individuals giving their input on everything. The Internet has allowed the truth and facts to spread like never before, online reviews and opinions can make or break companies, and social media has made many aware of a wide range of issues. Will more *Homo sapiens* perhaps see the reality of the world around them through the Internet, and thus be motivated to get involved and help initiate positive changes throughout the world?

With the Internet, truth and knowledge cannot be suppressed any longer, and even though some countries have governments, private companies, or organizations which engage in some form of Internet censorship or surveillance, many still have access to the majority of the data which makes up the Internet. The United States, France, Germany, Pakistan, United Kingdom, Australia, Turkey, Thailand, Sri Lanka, Egypt, China, North Korea, India, Iran, Russia, Cuba, Saudi Arabia, Syria, Sudan, Vietnam, and a few other countries have engaged in some form of Internet censorship and/or Internet surveillance. All *Homo sapiens* with access to the uncensored Internet have the ability to seek out and find the truth, and this is why freedom among other things is so important to the not only the pursuit of knowledge, but the spread of that knowledge. The Internet has allowed individuals to have less dependence on monopolized medical, scientific, technical, and other knowledge. It has opened up a vast public forum and opinion network allowing for the truth to spread, while exposing the lies. It has allowed ancient, forgotten, or little-known knowledge to reemerge, and become reutilized by a whole new generation that sometimes even finds new applications for it.

For the most part, the vast majority of *Homo sapiens* are peaceful and loving, so much so that one could speculate all they are lacking is some basic education when it comes to nature, lifestyle, conservation, and coexisting on Earth. As technology and other aspects of the civilized world reach every corner of the globe, this education could possibly become a reality. As more *Homo sapiens* become educated and have access to education many old negative habits, lifestyles, traditions, superstitions, and cultural traits that have hindered the progression of *Homo sapiens* for thousands of years will continue to disappear. How much more informed and educated would the world be if every individual read one or more factual scientific book or research paper every month? How much more rapidly would science progress if more engaged in citizen science?

Future Questions

To try and predict what will happen is very difficult considering there are things that no one knows the effects of, and more importantly, no one can predict exactly how Earth will react to the negative actions of *Homo sapiens*. Given that modern *Homo sapiens* have inhabited Earth for just over one-thousandth of a percent of the planet's existence, and looking at how modern *Homo sapiens* have parasitically acted towards the Earth, it is easy to be pessimistic when thinking of what the future might be. Will the atmosphere of Earth be so polluted that one will need a spacesuit to go outside? Will *Homo sapiens* be forced to inhabit the depths of the ocean instead of the surface? Will *Homo sapiens* be forced to leave Earth for other planets in our solar system? Can all *Homo sapiens* unite for a massive global campaign to change and help save Earth? Is there even enough time to turn things around and save Earth? Or is it too late, has too much damage having already been done, and Earth is now doomed as a result of *Homo sapiens* past and continuous actions? What if the other countries of the world with billions of *Homo sapiens* attempt to modernize their countries, and follow the same or a similar destructive path as Westernized Civilizations have, adding to the wasteful consumption and resulting in even further environmental destruction?

Or one can be optimistic and ask, will *Homo sapiens* eventually find a balance with Earth, and coexist with what is left of nature and the natural world? Can the scientific community, governments, conservation groups, and other social and environmental organizations around the world initiate the change needed on a global scale? Will more scientifically minded and educated individuals be elected to more government positions? Will even more strict laws and policies be enacted that will help to protect Earth in the future, ultimately repealing past laws and policies that have failed and brought so much environmental destruction to Earth? Can all the individual members of society do their part in helping to change and sustain a balanced world by simply lessening their footprint through altering their lifestyle? Will education and example be enough to make new civilizations less Western, especially in their lifestyle choices? Will these transitioning civilizations be the leaders in renewable energy use, recycling, organic food consumption, etc. following a greener living path? Will *Homo sapiens* make the difference by initiating simple meaningful changes to their lifestyles, which could have a large impact towards the conservation of Earth? Can *Homo sapiens* revert back to ecocentrism and away from industrocentrism and technocentrism? If computers and other technology continue to add further automation to society will this eliminate manual labor and allow more *Homo sapiens* to focus on art, science, history, or other

fields of knowledge? What will society be like if *Homo sapiens* continue to utilize science following a set of virtues based on humanness, altruism, justice, frugality, kindness, selflessness, integrity, and humbleness in conjunction with a renewed connection with nature while coexisting with the Earth? Will *Homo sapiens* ever reconnect with nature and achieve a more Utopian society? Can *Homo sapiens* coexist with the florae and faunae of Earth without attempting to control, manipulate, assimilate, or destroy it? Will the current minority, whose existence does not revolve around negative elements, and who coexists with Earth peacefully, ever become the majority? Will the mainstream ever be more positive rather than negative? Only time will perhaps answer these questions definitively.

Perhaps *Homo sapiens* will begin to live more naturally, utilizing products which are made of natural materials and are 100% biodegradable. Perhaps in the not too distant future *Homo sapiens* will once again live in harmony with nature, coexisting with all flora and fauna species which also inhabit this Earth, much as their ancient ancestors did for thousands of years. Then the Earth will get the much-needed respite it needs, healing and rejuvenating naturally without the unneeded interference of *Homo sapiens*. *Homo sapiens* started in one area of Earth, most likely somewhere in Africa, they expanded and will continue expanding, perhaps even into the far reaches of space in the distant future, but they must do it in a manner which does not depredate these new worlds, like has been done to Earth. Or perhaps this will be the ultimate evolution of *Homo sapiens* to conquer and colonize barren worlds like the moon and mars with tons of plastic, and at least on these worlds there is little to no life which can be destroyed, it will in essence be a sandbox that *Homo sapiens* can play and create in without damaging much.

CHAPTER VIII. Going Back to Nature and Coexisting on Earth

Homo sapiens Pseudo Connection with Nature

Many *Homo sapiens* have a pseudo connection with nature, riding a bicycle, fishing, skiing, or hiking from point A to point B as quick as possible, destroying the landscape with an off-highway vehicle (OHV), geocaching, hunting animals for sport, etc. They are known as weekend warriors and many engage in extreme sports in the wild trying to see how far one can push the limits of nature. Others bring elaborate RVs into remote ecosystems often polluting these areas with raw sewage or other waste. These *Homo sapiens* are not truly in touch with nature, they are simply passing through nature while ignoring the beauty and perfection which surrounds them. Many go into nature to escape the thrall of society, to get fresh air as they call it and escape what they label as the real world, but most are simply changing locations and not truly experiencing the natural world. They bring their high-tech gadgets and other gear which does nothing more than prevent them from truly seeing nature. Aldo Leopold wrote,

“...A gadget industry pads the bumps against nature-in-the-raw; woodcraft becomes the art of using gadgets. And now, to cap the pyramid of banalities, the trailer. To him who seeks in the woods and mountains only those things obtainable from travel or golf, the present situation is tolerable. But to him who seeks something more, recreation has become a self-destructive process of seeking but never quite finding, a major frustration of mechanized society...Everywhere is the unspecialized motorist whose recreation is mileage, who has run the gamut of the National Parks in one summer, and now is headed for Mexico City and points south...Recreation, however, is not the outdoors, but our reaction to it.” (646)

Most *Homo sapiens* enjoy being in nature but do not know why, and it is most likely because most *Homo sapiens* have lost the vital connection with nature itself. If one actually spends any length of time in nature simply observing every aspect encountered, they will perhaps begin to see the harmonic balance with which all the species display. When one lets go of everything else, and temporarily suspends all thoughts about the civilized world and simply observes the vast natural world which surrounds them, and then perhaps one will see and truly experience nature. When observing nature from the perspective of a naturalist sometimes it's more about the details, the dimples in a rock, the shadow a cloud casts, the lines in a leaf, etc. Thoughts can be more focused on the things within nature, like how much energy an insect must have to fly around all day? Could a flower possibly give it enough nectar to sustain flight, or possibly it has evolved to utilize only a small portion of energy? Or could the Sun perhaps be an energy source for the insect as well? If one opens not only their eyes but their ears also and listens they will hear the voice of Earth in the birds singing, the sound of an insect buzzing past, the sound of wind stirring the trees and grass, the sound of water flowing, the thunder from a nearby storm, etc. If one walks within nature focusing on the details of everything they encounter, they will perhaps truly see not only the perfection and beauty with which it is all created, but also witness true coexistence between many species which all live in perfect harmony.

If *Homo sapiens* spend less time submerged in the synthetic world which they have created, and more time studying and reflecting on nature and the meaning of life, they could perhaps advance well beyond their current philosophical state. If one chooses, they can also view nature in a meditative way not contemplating anything and obtaining inner silence, and being completely absent of thought, not even thinking about how nature works or even really why nature functions the way it does, but just observing and enjoying the show. A good exercise for this is to observe a species of flora which is in bloom, and sit next to it and observe all the insects which visit the flora for any given length of time.

Some *Homo sapiens* have a habit of feeding wild fauna food. This not only disrupts the balance of the ecosystem, but it can also cause health issues for the fauna which does not normally consume this type of food. Many *Homo sapiens* place hummingbird feeders or dispense bird seed to attract wildlife, or with the erroneous notion that birds and other wild fauna need food and that they are helping these fauna. But in actuality they are

disrupting the natural cycle and doing more harm than good, if hummingbirds feed from feeders instead of florae then the florae are losing out on potential pollinators, and if birds feed on seeds which are provided by *Homo sapiens* instead of wild seeds, this potentially interferes with florae that rely on birds consuming their seeds and excreting it through their feces to disperse their seeds. Hummingbird feeders are usually filled with a mixture of water, sugar, and red dye, which not only makes an unnatural concoction, but can also be a potential vector for bacteria to thrive in which can cause illness and even death to hummingbirds. Would it not be more logical to plant florae which naturally attract birds?

Many of those that do have a flora rich yard, do so only for the aesthetical pleasure it brings them, and not to connect with nature or make the Earth greener. They attempt to control nature and are nothing more than perfectionists with gardening tools, fertilizers, and pesticides attempting to play God with their selective faunae, while usually killing most native flora species. Many *Homo sapiens* try to create perfection be it a manicured lawn or synthetically created things, and yet the irony is that true perfection surrounds *Homo sapiens* in nature, and *Homo sapiens* destroy that perfection trying to create a synthetic perfection which is actually the exact opposite and not perfect at all. Many *Homo sapiens* only focus on one aspect of nature and only see beauty in a single species while ignoring the rest of nature. Is nature in all its entirety not beautiful, the landscape, weather, geology, and all flora and fauna species, how everything coexists in a harmonic ecological system? How can one not see the beauty and perfection in all of nature, from the insect pollinating a flower to the fly laying eggs on feces? Are not all bird songs beautiful be it screech or chirp based?

Survival entertainment shows and other nature themed shows all focus on interaction and dominance over nature and the natural world. Some *Homo sapiens* only knowledge of nature is through commercialized entertainment related nature documentaries, which for the most part are not educational, but rather theoretically based and portray a false reality, while others are interactive with the nature, which is unnecessary when documenting nature or attempting to educate. Many nature documentaries have become nothing more than eye candy, (e.g. the great white shark eating, two faunae fighting to the death, faunae chasing and catching a meal, a cute baby fauna playing, etc.) this is a fascinating part of nature, but it is only a very small portion of nature. The majority of nature documentaries focus more on the negative aspects of nature while relying on sensationalism and death to gain an audience. They film only a handful of species and tend to show shots for only a split second. How much more educational would nature documentaries be if they had far less speculative narration and longer shots which allowed the audience to absorb the beauty and magnificence of nature?

Some *Homo sapiens* bring nature into their home only to neglect it and inflict a slow and perhaps painful death. Too often those who do keep real florae do not properly care for them, either from too much or a lack of water and/or sunshine, and often plants are kept in such small containers as to cause the flora to become root bound. Nature in the city or inside a dwelling has often been replaced with artificial flowers, shrubs, grass, stone, and wood. The real florae which have been replaced indoors and even outdoors with plastic imitations do nothing more than pollute the Earth and create a faux presence of nature. Plastic furniture is made to imitate wood in appearance, but in reality, it is nothing like real wood, as it has far less strength and durability while also being nonbiodegradable and even toxic. Many *Homo sapiens* crave nature, but some seem to be satisfied with the plastic imitations which have replaced it. One need only look around to see that they are surrounded by nature, but it is in the artificial form of paintings, cheaply made figurines, mascots and emblems, clothing, plastic florae, imitation wood, etc.

Florae and faunae are interwoven into Easter, Christmas, Thanksgiving, Halloween, and other holidays, they have been used as mascots, emblems, symbols, advertisements, and even incorporated into product names, often with a negative and even false representation of the flora or fauna. Death, fear, predation, or some other negative aspect are what is usually focused on while beauty and coexistence are not. There is so much nonsensical destruction of nature like when a photographer picks 20 species of flora to take some sort of artistic collage type photograph, or another artist sets flora on fire to take a photo of the burning flora in order to make some sort of statement. These senseless, destructive, and pointless actions do nothing but show the artist's lack of respect for the true art being destroyed which is nature. Can *Homo sapiens* not find more ways to be creative without adding destructive elements?

If *Homo sapiens* do not have a connection or genuine interest in nature, then they will most likely feel no sense of loss when it is destroyed. If one is taught to fear, hate, and conquer nature from childhood how will they ever coexist? If one grows up in a city completely isolated from nature, and all they see and know is the artificially created world which *Homo sapiens* have invented having no real connection with nature, how can they ever be expected to appreciate and respect nature much less to coexist on Earth? Perhaps this lost connection with nature is why so many *Homo sapiens* lack humanness in even the most basic sense of the word. Perhaps if they simply had a basic understanding of Confucianism and altruism this would not be the case. Can *Homo sapiens* act more humane towards all species on Earth? What kind of dramatic affect would this have on the world and the future?

***Homo sapiens* Misconception of Nature**

Too often *Homo sapiens* desire to be the best or first, often citing evolution and focusing on competition between species to survive, whereas coexistence and symbiotic relationships, which are in fact, far more common in nature are hardly ever mentioned. Yes, there is competition among nature's species of florae and faunae, but it is miniscule when compared with all of the millions of other species which exist alongside one another and never interfere with other species coexisting in perfect harmony. This focus on competition is frequently referred to as good and natural, and it is said that competition is the only true way for economic progress or even necessary for any progress of *Homo sapiens* as a species. But how good and natural is it? Is competition even necessary? At an address given in 1936 Albert Einstein said,

"Darwin's theory of the struggle for existence and the selectivity connected with it has by many people been cited as authorization of the encouragement of the spirit of competition. Some people also in such a way have tried to prove pseudo scientifically the necessity of the destructive economic struggle of competition between individuals. But this is wrong, because man owes his strength in the struggle for existence to the fact that he is a socially living animal. As little as a battle between single ants of an ant hill is essential for survival, just so little is this the case with the individual members of a human community.

Therefore one should guard against preaching to the young man success in the customary sense as the aim of life. For a successful man is he who receives a great deal from his fellowmen, usually incomparably more than corresponds to his service to them. The value of a man, however, should be seen in what he gives and not in what he is able to receive." (61)

Many *Homo sapiens* obsessed with the extremes of nature, (e.g. the speed of a fauna, the extremely long or short lifespan, the adaptive camouflage a species possesses, the strength of a tiny insect, the vast population numbers of a species, how much a species can withstand, etc.) but these are simply evolutionary traits, and yes they are amazing, but they should not be the focal point as they are nothing more than a display of diversity and the process of evolution. What is the even more amazing is the entire system of nature, and how it functions as a whole, and when one sees this they will then perhaps truly respect nature and want to coexist with it.

There is a lot of consternation by *Homo sapiens* with regard to how they view nature, and this ultimately causes much confusion and inaccurate assumptions to be made. Many *Homo sapiens* are repulsed when seeing feces, maggots on carrion, or other natural processes within nature. They choose to only see aesthetic beauty in certain mainstream aspects of nature, (e.g. flowers, sunsets, butterflies, etc.) and do not see the perfection, complexity, and fragility much less the overall beauty in every aspect of nature. Would these same *Homo sapiens* still find a butterfly beautiful if they knew that it used its proboscis on feces at times?



SOURCE: The Nature Explorers – Ecosystems of Western North America Series – The Uinta, Wenatchee, and Bob Marshall Expeditions - Insects, Bugs, Butterfly, Beetle Fauna Animals – Several butterfly species using their proboscis on feces.
<http://www.thenatureexplorers.com>

Some species are given a name in reference to something relating to *Homo sapiens*, or the name is completely inaccurate, (e.g. carpenter ant, Jesus spider, killer whale, etc.) but this too often only leads to misconceptions and erroneous assumptions about a species. The ant is not building anything as a carpenter does, the Jesus spider is not religious, a killer whale has never been known to have killed *Homo sapiens* in the wild, and yet they possess these names, some of which have a negative connotation. Can they not be called simply what they are an ant, a

spider, and a whale? Too often nature is looked at as being sinister, but nature is incapable of being evil, it is not an enemy of *Homo sapiens*, as is depicted in George Orwell's '*Animal Farm*', M. Night Shyamalan's '*The Happening*', or James Patterson's and Michael Ledwidge's '*Zoo*'. To the contrary, nature is the source of all life, including *Homo sapiens*, and without it *Homo sapiens* would be nothing. *Homo sapiens* are the only species on Earth to engage in war and the wanton destruction of Earth, and the only species that engages in hate, greed, murder, envy, revenge, tyranny, and other negative things.

Some scientists only learn from books or in a laboratory setting and never perform any direct observations of nature, thus making many erroneous assumptions based on someone else's words in a book. And when they do explore nature some of them seem more concerned with the discovery of species rather than with the actual study of them, once a species has been discovered they are in search for the next one. Some are like this because they want to be the one who discovered it and thus gets to name it, but ironically although many species have not been documented some of these species have already been discovered by someone over the last million years who first saw it, and this is simply the result of living in the wild for a lifetime versus being in the wild for a few months or years during a lifetime.

Study an ecosystem year-round every day for several years and one will see many more flora and fauna species. There are of course species which appear for several weeks or months out of the year, some are year-round, but even more rare are the ones which appear briefly for only one day, and then disappear not be seen again for years. This is usually due to the perfect environmental conditions, temperature and moisture most specifically, but can also be flora related. (e.g. if the flora is dormant then so are the insects that live in symbiosis with it) Years and even decades may go by and all the while the flora and fauna species is waiting patiently dormant for the right conditions. Many ecosystems of Earth have never had been studied this thoroughly, hence there are perhaps a vast number of flora and fauna species which no one has ever observed and cataloged in modern times.

It is often overstated by some scientists and in many nature documentaries that everything in nature is about competition for resources and space it's a game of survival of the fittest, but this is incorrect. Most nature documentaries focus on the negative and sensationalist aspects of nature instead of what is happening in nature as a whole. After having directly observed nature for thousands of hours while on expedition, I have concluded that there is far more coexistence in nature than is given credit. Many flora and fauna species rely on each other for existence, and the majority of so called, '*competitive fauna species*' coexist together in a perfect balance using the same food sources.

That is not to say that there are not predators, and that these predators do not feed off other fauna species, but when looking at vegan faunae versus carnivorous faunae one will find a perfect harmonic balance. These species do not attempt to hoard or guard the food source they do not kill or aggressively compete with the other species over food or space, and they most certainly don't exploit other species. To the contrary the food and space are in fact vast and there is plenty of it for a very diverse population of flora and fauna. And a balance is created within nature providing ample food resources which are a result of favorable climatic conditions and other factors keeping all flora and fauna populations in check as well.



SOURCE: The Nature Explorers – Ecosystems of Western North America Series – The Lemhi, Beaver Dam Slough, Scablands, and Bob Marshall Expeditions – Insects and other Fauna – A variety of different insect species feasting together on the same flora which provides endless food to any that wish to consume it, all these insect species coexisting in perfect harmony. <http://www.thenatureexplorers.com>

One will never see birds attacking each other because they sing a different song, but instead they create a symphony of sounds along with the squirrels, cicadas, or other vocal faunae. Many things which are interpreted as attacks or aggressive behaviors in nature are nothing more than playful acts between the same or even different species. The only species which are dominant in their lifestyle and actions are *Homo sapiens* who invade, exploit, and destroy ecosystems for their sole benefit, and with no regard for any other species within the ecosystem, often times including themselves. If one need visual evidence of this fact they can simply watch The Nature Explorers 'Insects and Other Fauna of Western North America' parts 1 to 26 and they will see many species coexisting, some will move away when approached by another species, while others simply ignore the other species, as it is no threat. Even within flora communities one will see trees growing in perfect harmony often with their roots, branches, and trunks entwined.



SOURCE: The Nature Explorers – Ecosystems of Western North America Series – The Amistad Expedition - Insects, Bugs, Butterfly, Beetle Fauna Animals Part 22 / timestamp: 25:57 – 27:52 – Coexistence is displayed between a species of ladybug and fly. We do not see the fly fleeing or attacking the ladybug as it crawls over it for nearly 2 whole minutes and even touches the eyes of the fly, but instead the fly sits patiently and allows the ladybug to do what it naturally does, search for aphids to consume, possibly even off the fly itself, and ultimately helping the flora in addition to the fly and other insects which are dependent on the flora as a food source. If more *Homo sapiens* acted this way when flies and other insects landed on them, instead of shooing it away, perhaps they would have that interaction with nature they primitively crave so much. <http://www.thenatureexplorers.com>

Most competition that I have directly observed in nature is between members of the same species, and it is usually for mating rights, and not regarding food or space. Members of the same species, such as ants or bees, often work together, and not against each other as so many *Homo sapiens* do. *Homo sapiens* compete more than any other species on Earth, and it is usually not with other species, but is among members of their own species and often it is for pleasure. It has been stated that nature is organized chaos and that there is not real harmony within nature. But this chaos is usually the result of some outside force be it a natural one like an extraterrestrial object impacting Earth, or an anthropogenic one like global warming or an invasive species being introduced into an ecosystem. The natural chaos is unavoidable, but the anthropogenic ones are absolutely preventable.



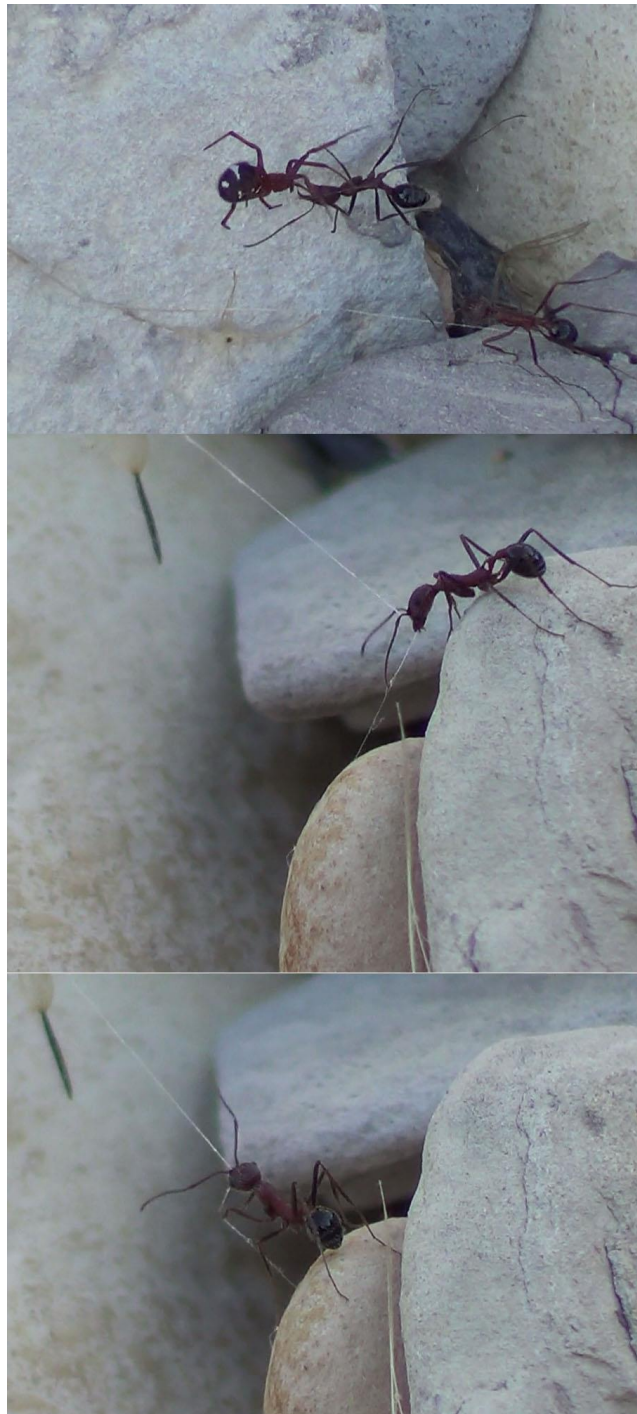
SOURCE: The Nature Explorers – Ecosystems of Western North America Series – The Kootenai Expedition - Insects, Bugs, Butterfly, Beetle Fauna Animals Part 14 / timestamp: 18:39 – 18:48 - Even at the nearly microscopic level there is coexistence between four different species of insect on a fungus. - <http://www.thenatureexplorers.com>

Homo sapiens have a very basic understanding of nature knowing how some of nature functions, but still little to no idea as to why. And when it comes to unexplainable natural phenomenon like antennae, communication, and similar things, there is even less insight. Unexplainable natural phenomenon is sometimes just simply dismissed as unexplainable, and too often the excuse is used that it is not worth understanding, while advanced intelligence is never given any consideration whatsoever. Take for instance a lizard doing pushups, or birds singing at dusk and dawn, are these traits territorial, part of mating, or something else? One can postulate all day on unexplainable natural phenomenon, but the fact of the matter is no one really knows except the fauna itself, and sometimes it's not revealing exactly why. Perhaps not everything can be proven with scientific evidence yet, and some things possibly could never be proven with science. It is therefore very important not to assume or dismiss any explanations until it has been proven definitively through science, when possible, because it should always be remembered that the absence of evidence is not evidence of absence.

There are many misconceptions about nature and especially that of faunae, with regard to their level of their intelligence and emotions. Often times, some base their premise on the erroneous notion that there is, and should be a separation between that of *Homo sapiens* and other species, because *Homo sapiens* are separate from the all other species, and anything else of the sort is nothing more than anthropomorphism. That all faunae have a purpose, but in no way possess any form of actual intelligence or emotions. Faunae simply serve their purpose and then die, and their offspring continue this process as they have for millions of years. But I along with some other individuals do not agree with this. Some previous ideas that were discounted as anthropomorphic and not scientific are being proven with strong observational and experimental studies. Episodic memory has been shown to exist in faunae after having once thought to only exist in *Homo sapiens*. Some fauna species mate for life which is evidence of a strong bond or even love and many species also grieve when losing a member of their species. (e.g. elephants, chimpanzees, peccary, etc.) The use of tools is not a feature of intelligence solely possessed by *Homo sapiens*, it has been observed throughout nature in chimpanzees, bonobos, orangutans, gorillas, badgers, bears, elephants, dolphins, sea otters, woodpeckers, crows, warblers, larks, parrots, vultures, raptors, owls, gulls, herons, alligators, crocodiles, triggerfish, stingrays, wrasses, damselfish, archerfish, cephalopods, wasp, ants, bees, beetles, and other insects. So, it would appear that *Homo sapiens* are not so

unique, and most certainly not the only species on Earth to have intelligence, emotions, thoughts, or memories.

It is often said that faunae cannot feel pain, and that this is further evidence that they have not feelings or emotions, yet ants and many other insects, when pain is inflicted on them, will make a squealing or other noise often not audible to the human ear. Mice, pigs, monkeys, and other faunae will also squeal or make another noise when dying in pain. Does this pain not constitute feeling and emotion? One can see clear evidence of behavior in a variety of fauna species which *Homo sapiens* often use to define themselves as having intelligence, emotion, and ultimately the right to life. (e.g. socialization, teamwork, providing assistance to fellow species members which is sometimes even lifesaving, etc.) Based on these qualities do not all faunae deserve respect? Do not all faunae also have an intrinsic right to live freely without being exploited or killed for any reason?



Some hold the opinion that *Homo sapiens* are the pinnacle of evolution, and that all the other flora and fauna are far less evolved and less intelligent because they do not have advanced language, tools, or recognizable emotions, and that fauna species which are peaceful, simple, have a short lifespan, or possess a small brain or no brain at all are dumb and inferior. But perhaps it is *Homo sapiens* that are the species which is actually less evolved, perhaps these other fauna species do not need language, tools, or emotions as they have evolved past these things. What if they have no need for language, what if they have evolved beyond *Homo sapiens* form of communication and instead utilize ESP or some other unknown communication? What about the many observed unexplainable phenomenon in nature like flocks of birds changing their flight patterns instantaneously at the same exact moment? Or where does the energy come from which allows a tiny insect to beat its wings hundreds of times per second or more, could it be from the sun? Or perhaps it possesses a form of energy that scientists have yet to discover? When anything is beyond logic, current understanding, or cannot be proven with scientific analysis or experimentation it is usually dubbed unexplainable phenomenon. With all the things dubbed as unexplainable phenomenon in nature, is it so hard to imagine that there are perhaps species qualities that go far beyond what *Homo sapiens* possess or deem as intelligent?

Unwarranted Fear of Nature

Some *Homo sapiens* kill all insects on sight when they come into contact with them, from either being repulsed by insects or from an unwarranted fear based on a lack of knowledge about nature, be it from no experience, no education, or misinformation. Many of these *Homo sapiens* have an unwarranted fear of nature due to a lack of understanding, and much of this fear is often instilled at a young age due to wise tales, fictional entertainment, or other sources of misinformation. Frogs causing warts is an example of this, or the unwarranted fear and actions of thinking that particular fauna (e.g. bears, bees, sharks, snakes, spiders, wasps, wolves, etc.) will just randomly attack *Homo sapiens* at will for no reason, but this is an illogical, erroneous, and harmful mentality based on fiction and not scientific fact. Many *Homo sapiens* which have been attacked by fauna in the past perhaps did not realize they might have provoked the fauna to strike in defense or out of fear. Jean-Henri Fabre wrote,

"Fame is the daughter of Legend. In the world of creatures, as in the world of men, the story precedes and outlives history. There are many instances of the fact that if an insect attract our attention for this reason or that, it is given a place in those legends of the people whose last care is truth." (629)

This misunderstanding then creates wise tales that spread throughout time causing mass hysteria towards certain fauna species, ultimately resulting in the death of many species of fauna which balance ecosystems and could actually benefit *Homo sapiens*. Take arachnids for example, particularly spiders and scorpions, there are a very small percentage of arachnid species which are deadly to *Homo sapiens* and most cannot even penetrate *Homo sapiens* outer skin layer, nor does their venom have any effect. Yet, millions of spiders and scorpions are killed each year based on a mentality of kill every spider without even attempting to identify the species as harmful, or much less to relocate the specimen back into the wild without exterminating it. And the irony is that these arachnid species keep the balance in nature by feeding off many of the insect species which can spread harmful diseases to *Homo sapiens*. (e.g. assassin beetles spreading Chagas Disease, mosquitoes spreading malaria, ticks spreading Lyme disease, etc.) Will *Homo sapiens* ever stop unnecessarily exterminating arachnids out of fear and misconception, and instead allow these arachnid species to help them? How can anyone be expected to respect and coexist with nature when they are taught to fear nature because of information based on fantasy, myth, or another erroneous source and not scientific facts?

Lost Connection with Nature

To be surrounded by nature for an extended period of time, months, or perhaps even years, and to recapitulate one's brief life while observing and thinking about the outside civilized world, it is truly awe inspiring and enlightening. If more *Homo sapiens* experienced this, versus only the *Homo sapiens* made cities, they would

perhaps wonder more about the meaning of life and have far more respect for the Earth and the other flora and fauna which also inhabit the planet. For in the city, it is all created by *Homo sapiens*, the God of the city so to speak, and there is an answer for everything, and a solution to every problem encountered leaving no wonder or anything to let the imagination truly ponder like in the wilds of nature. *Homo sapiens* have severed their ancient roots with nature and now live in a synthetically created world which they have built on the surface of Earth. Most *Homo sapiens* are completely oblivious to nature and the natural world around them, and they focus only on the artificially created world of society and civilization. The man-made cities drowned out the sounds of nature, and one must truly focus and concentrate to hear a bird, or if so lucky as to hear passing water running below the concrete covered ancient stream. These natural sounds have been silenced and masked with the unnatural negative sounds of sirens, loud automobile engines, horns, construction equipment, garbage trucks, and other city sounds severing *Homo sapiens* even further from nature. Stop in the city and look at a bird in a tree, and then look around you, and you will most likely be viewed as an oddball staring into a tree while everyone passes by staring at you wondering what you are looking at or perhaps if you are insane. Al Gore wrote,

"The edifice of civilization has become astonishingly complex, but as it grows ever more elaborate, we feel increasingly distant from our roots in the earth. In one sense, civilization itself has been on a journey from its foundations in the world of nature to an ever more contrived, controlled, and manufactured world of our own imitative and sometimes arrogant design. And in my view, the price has been high. At some point during this journey we lost our feeling of connectedness to the rest of nature." (274)

If *Homo sapiens* are not affected directly by the depredations of Earth and do not feel a sense of sorrow and pain as a result, perhaps it is that they have no true connection with nature. If *Homo sapiens* reconnect with nature on a daily basis their outlook towards conservation and nature in general could most likely change drastically. Like the old adage asks, if a tree falls in the woods and no one is around to hear it does it make a noise? Many *Homo sapiens* cannot hear Earth hurting because they have lost the ability to hear her voice through a connection with nature, they have become apathetic towards Earth, and obstinate in their ways. Mother Earth is crying loudly from *Homo sapiens* depredations, but few are listening because they cannot hear her, and they cannot hear her because they are so disconnected from her. John Muir wrote,

"But few indeed, strong and free with eyes undimmed with care, have gone far enough and lived long enough with the trees to gain anything like a loving conception of their grandeur and significance as manifested in the harmonies of their distribution and varying aspects throughout the seasons, as they stand arrayed in their winter garb rejoicing in storms, putting forth their fresh leaves in the spring while steaming with resiny fragrance, receiving the thunder-showers of summer, or reposing heavy-laden with ripe cones in the rich sungold of autumn. For knowledge of this kind one must dwell with the trees and grow with them, without any reference to time in the almanac sense."

"The influences of pure nature seem to be so little known as yet, that it is generally supposed that complete pleasure of this kind, permeating one's very flesh and bones, unfits the student for scientific pursuits in which cool judgment and observation are required. But the effect is just the opposite. Instead of producing a dissipated condition, the mind is fertilized and stimulated and developed like sun-fed plants." (626)

Nature has been worshiped, admired, and envied by *Homo sapiens* throughout history, but it has rarely been truly respected and coexisted with. Almost all *Homo sapiens* like some aspect of nature, but liking all aspects of nature and seeing how it is connected and made to perfection seems now to be an extremely uncommon quality. Evidence for this can clearly be seen in the lack of respect for Earth and the lifestyles many *Homo sapiens* choose to live. This could be a result from *Homo sapiens* lack of interaction with nature on a daily basis, preoccupation with artificially created society related things, or simply a lack of education, exposure, and general knowledge regarding scientific subjects.

Some are fascinated with nature or some portion of it, but often for the wrong reasons, they attempt to control it or understand it by experimentation instead of respecting and coexisting with it while understanding it through observation. Some like a specific flora or fauna species because it is symbolic in some way, offering a sense of pride or courage. (e.g. most Americans like the bald eagle as it is both the national bird and symbol the United States of America, when they see the bald eagle they think United States, and the bald eagle usually with an American flag can be seen incorporated into tattoos, t-shirts, memorials, etc. But unfortunately, far less see the

true beauty of the bald eagle and the balance it has brought to eco-systems within nature for millions of years)

The absent connection with nature has resulted in many *Homo sapiens* not understanding Earth or even knowing that nature exists simply from lack of exposure. This is also perhaps one of the most evident reason as to why some *Homo sapiens* willingly and inadvertently destroy Earth through their lifestyles and actions. Many times, *Homo sapiens* do not perceive the damage that has been caused to the Earth. They do not notice that faunae are non-existent, florae are damaged, or the ground is bare and is absent of florae entirely. This false sense of perception and lack of respect also leads to many *Homo sapiens* inadvertently destroying florae and faunae simply by not watching where they are stepping when walking, like in the opening scene of John Patrick Shanley's 1990 film '*Joe Versus the Volcano*'. How can anyone be expected to respect nature and coexist with it when they are taught the exact opposite, and have never truly experienced a connection with nature? Stephen Jay Gould wrote,

"We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well—for we will not fight to save what we do not love" (627)

Technology has done marvelous things for *Homo sapiens*, but at the same time it has helped to create a barrier for many between reality and the virtual world. *Homo sapiens* can unplug and experience the reality of nature, and perhaps find a balance between technology and the natural world around them. If one simply unplugs from the Internet and other anthropogenic sources of synthetic reality and takes in the natural world which surrounds them they will clearly see it. Current generations and those of the future might find it even more difficult to find a connection with nature when all they have known is civilization and the cities. Fortunately for most, there is a connection somewhere deep within *Homo sapiens* which beckons nature, and through that connection from within some will always find nature, no matter the circumstances.

One could easily argue that *Homo sapiens* have been on a path of parasitic self-destruction since the species first began to over tax the environment for needless things and began to severely depredate the Earth as a result. Many of the things that some *Homo sapiens* have done, and currently do, are unimaginable and futile to the logical scientifically minded. How *Homo sapiens* can engage in activities which destroy everything around them is beyond comprehension, perhaps they do not realize they are destroying themselves in the process as well, or perhaps they simply do not see the beauty in nature which they are surrounded by. Some *Homo sapiens* seem more preoccupied with pleasure and indulging in the materialistic things that give them a temporary sense of satisfaction, rather than with the actual meaning of life. They are very much content with the world the way it is and are satisfied with civilization wanting nothing more from life. They have a self-important belief that the purpose of life is happiness and the pseudo freedoms created by society, and many *Homo sapiens* appear to have become indulgent in anything that makes them happy.

Isn't one of the main purposes in life to seek out and find answers about the universe through logic and science? What started it all? Why are we here? In all of the time *Homo sapiens* have been on Earth, they have still failed to answer two of the most important questions with logical and truthful answers. What is the meaning of life? And what happens when you die? In place of the truth, religions have invented pseudo answers based on mythology and many *Homo sapiens* have been content with these lies, because for many it is easier to believe a lie than to question it and search for the truth. For thousands of years, religions have given *Homo sapiens* the wrong answer to the meaning of life and it has been accepted by most and rarely ever questioned. Unfortunately for most religious followers they do not question the answers given, nor the source of it, for if they did they would see how erroneous all organized religions truly are. Everyone should question everything, except scientific facts, especially if it is based on faith. If one simply believes everything they are told and bases everything in their life on faith one is nothing more than a follower, and not an individual.

Some *Homo sapiens* are a product of their environment, and are nothing more than a number, doing exactly what has been commanded by others and not resisting in the slightest manner ever, and rarely if ever do they think about the meaning of life, as the meaning has already been determined by the system of society. Some *Homo sapiens* suppress their true self and act as others want them to, and they attempt to find the meaning in life through meaningless things being so easily influenced by others, and often in a negative way. All *Homo sapiens*

have their own individual life and are unique in their own way, to suppress this is to deprive evolution to not only oneself, but also to the world.

Some *Homo sapiens* have become very blasé with regard to life itself, perhaps from being in civilization and having no interaction with nature. If more *Homo sapiens* want to figure out the meaning of life, perhaps they need to make that connection with nature again. The answers that one seeks to the question of, 'What is the meaning of life?' awaits anyone who looks at the source of where *Homo sapiens* originated, and that source is nature. And it is through observing nature like a naturalist and through coexistence with nature that one can find the true meaning of life. Can you discover nature and the meaning of life, coexisting on Earth? Or will you have your meaning in life chosen for you, and live in a synthetic world which has been artificially created by others?

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